# APPENDIX 8
# DISPERSION MODELING FILES

# APPENDIX 8-A
# AERMOD MODELING INPUT / RESULTS

# APPENDIX 8A
# CLASS II MODELING REPORT

## 8A.1 Introduction

### 8A.1.1 Background

The applicant, Toquop Energy LLC, plans to build and operate one new nominal 750-megawatt (MW) super critical pulverized coal- (PC-) fired boiler and steam electric generation unit located in Lincoln County, Nevada. The proposed project, referred to as the Toquop Energy Project (TEP), is being sited in a green-field location approximately 14 miles northwest of Mesquite, Nevada.

The TEP will include the full range of support operations, including delivery of lime for use in scrubber; truck delivery of diesel fuel; and truck delivery of other materials, such as anhydrous ammonia for the selective catalytic reduction control system, coal and ash handling, and transport of combustion byproducts and wastes. Best available control technology will be installed on all applicable sources, including the main stack.

This appendix describes the procedures and the modeling results that were used to evaluate the potential air quality impacts due to the proposed project's operations for areas within 50 kilometers (km) of the proposed facility. The TEP will be located within 300 km of several Class I areas in Arizona and Utah. No Class I areas are located within 50 km of the proposed facility. A separate report addresses the modeling of impacts at all Class I areas within 300 km of the project site.

### 8A.1.2 Regulatory Review

The facility is applying for an air permit to construct from the Nevada Division of Environmental Protection (NDEP), Bureau of Air Pollution Control (BAPC) in accordance with Nevada Administrative Code 445B, Paragraph 221(1) and 3375. Paragraph 221(1) adopts the federal Prevention of Significant Deterioration (PSD) program as promulgated under Title 40 of the Code of Federal Regulations (CFR) Part 52.21 (40 CFR 52.21). Permit approval requires that an air quality impact analysis be performed to assess the potential impacts of the facility operation under 40 CFR 52.21(k).

The proposed facility will be located in an area (Lincoln County) that is classified as a federal attainment area for all pollutants. Each of the involved agencies requires that the application use dispersion modeling to demonstrate compliance with applicable Ambient Air Quality Standard (AAQS) and PSD increments. This modeling appendix describes the procedures that were used for the air dispersion modeling for project permitting and certification.

A brief project description, including an overview of the site and local topography and a discussion of the emission sources, is presented in Section 8A.2. Section 8A.3 addresses the dispersion modeling methods used to assess local air quality impacts, the meteorological dataset and data processing procedures, terrain processing, and Good Engineering Practice (GEP) and building downwash calculations. Section 8A.4 tabulates the source emission parameters used in the modeling. The results of the modeling analysis are presented in Section 8A.5. Section 8A.6 contains a list of references.

## 8A.2 Project Description

### 8A.2.1 Site Description

The facility will be on a site consisting of approximately 650 acres of land located about 14 miles northwest of Mesquite, Lincoln County, Nevada (see topographic map of the area in **Figure 8A-1**). The site is open land with only high desert brush currently in place. The estimated site finished grade elevation is 2,550 feet above mean sea level (msl). The site is located within Township 11 South, Range 69 East.

The proposed site lies in a valley east of the Mormon Mountain Range at about 2,500 feet above msl, with land sloping downward gently to the southeast towards the Toquop Wash. Northwest of the proposed site, the terrain rises gradually for several miles before reaching elevations just above 5,000 feet msl in the East Mormon Mountains. To the southeast, the terrain gradually slopes downward to 1,500 feet above msl at the Virgin River before climbing rapidly to just above 8,000 feet msl in the Virgin Mountain Range. **Figures 8A-2** and **8A-3** are photographs of the plant site taken at the proposed project site location.

### 8A.2.2 Facility Description and Equipment List

The TEP will install and operate a PC-fired power plant with a nominal capacity of 750 MW. The coal-fired facility will consist of the primary equipment listed below:

- One 750-MW PC-fired boiler;
- Two auxiliary boilers;
- One firewater pump;
- One standby generator;
- One fly ash storage silo;
- One bottom ash storage silo;

**Figure 8A-1. Topographic Map of the Area in the Vicinity of the Proposed Project**

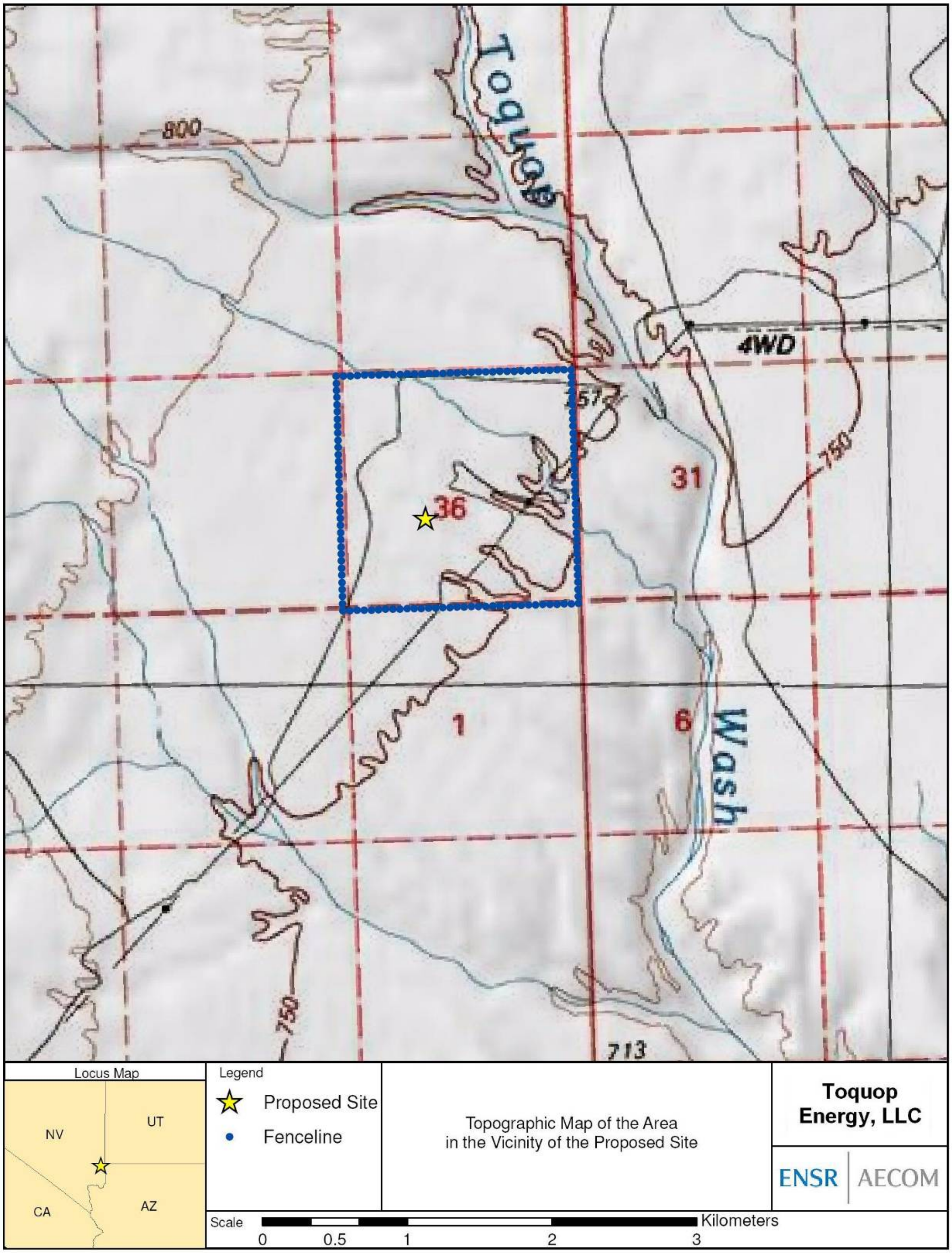


**Figure 8A-2. View from the Proposed Project Site Looking South**


**Figure 8A-3. View from the Proposed Project Site looking North**

- One gypsum silo;
- Two quicklime storage silos;
- One activated carbon storage silo;
- Two trippers;
- One Heller-type hybrid cooling tower;
- A coal unloading, reclaim and crushing operation;
- One active coal storage pile;
- One inactive coal storage pile; and
- A 150-acre on-site landfill.

Fuel for the TEP will be Wyoming Powder River Basin (PRB) coal, which will be transported to the facility via a proposed railroad with a spur from the Union Pacific to the TEP unloading station at the proposed plant site.

Overall annual availability of the power plant is expected to be in the range of 85 to 90 percent, but short-range modeling was conducted assuming a 100 percent load factor. The design contemplates a base-loaded plant.

### 8A.2.3 Process Description

The following sections describe the primary processes that are a part of the facility.

### 8A.2.4 Pulverized Coal Combustion

PC combustion is the most commonly used method of combustion in coal-fired power plants. It is a well-proven technology for power generation in utility-scale applications. In a PC boiler, coal is “pulverized” or ground to a fine powder so that approximately 75 percent of the coal is less than 75 microns and less than 2 percent is greater than 300 microns. The pulverized coal is blown into the combustion chamber with air, and combustion takes place in suspension at temperatures from 2,400 degrees Fahrenheit (°F) to 3,100°F. New supercritical plants can achieve overall thermal efficiencies of around 40 to 45 percent.

The TEP is being designed to operate with a range of coal properties that are typical of PRB coals. The latest PC projects being permitted, including this project, employ state-of-the-art add-on emission controls for nitrogen oxides ($NO_X$), sulfur dioxide ($SO_2$), and particulate matter with an aerodynamic diameter of 10 microns or less ($PM_{10}$).

#### 8A.2.4.1 Coal Unloading, Transfer and Handling System

Coal will be delivered to the facility via train and will be unloaded from the bottom dump rail cars into an underground bunker. A bottom dump unloading, consisting of two 2,500 tons/hour stations, will be used to unload the coal to an underground hopper at a combined 5,000-tons/hour rate. From the underground bunker, the coal will be handled using hoppers and belt feeders and will be stacked out to a lowering well using two conveyor belts rated at 2,500 tons/hour each. From the lowering well, a telescoping chute will discharge the coal to one of the coal storage piles. The active coal pile will be a 30-day supply of coal live storage, which can be stacked and reclaimed without the use of mobile equipment (bulldozers). Particulate emissions from the coal pile will be controlled by wet suppression. A second inactive storage pile will be built using both the automatic stack-out system and mobile equipment. The inactive storage will contain a 90-day supply of coal with the ability to expand to a 180-day supply of coal adjacent to the active storage pile. Emissions from the inactive pile will be controlled by the equivalent of wet suppression and compaction. The reclaim system (which is not used under normal operations) would be a rail-mounted scraper type, which would transfer coal at a rate of 2,000 tons/hour to two redundant coal reclaim systems, with enclosed conveyors to transfer the coal to the live storage pile or directly to the dual coal crushers.

From the active coal storage pile, front-end loaders will assist the reclaiming of coal into four 500-ton hoppers and feeder belts. Two conveyor belts rated at 1,000 tons/hour each (one in operation, one backup) will be used to convey the reclaim coal to the coal crusher building. In the coal crusher building, coal from the 1,000-tons/hour reclaim belts will empty into a 150-ton surge bin. In the coal crusher building, one coal crusher assembly rated at 1,500 tons/hour will crush the coal into a size suitable for combustion. From the coal crusher building, one conveyor belt rated at 1,000 tons/hour (with a second 1,000-tons/hour conveyor belt serving as backup) will transfer the coal to the boiler tripper deck. In the coal transfer tower, coal will be transferred to a 1,000-tons/hour tripper conveyor, which will load the five, 360-ton coal bunkers. A sixth coal bunker is provided as a spare. Particulate emissions from the coal unloading, transfer and handling system operations will be controlled by wet suppression and/or baghouses.

#### 8A.2.4.2 Storage Silos

In addition to the PC boiler, the primary TEP operation includes the following storage silos:

- One fly ash storage silo;
- One bottom ash storage silo;
- Two quicklime storage silos;
- One gypsum storage silo;

- One activated carbon storage silo; and
- One byproduct storage silo.

Fly ash from the PC boiler exhaust stream will be captured in the main boiler baghouse. The fly ash will be pneumatically conveyed from the baghouse hoppers to the fly ash storage silo. From the fly ash storage silo, the ash will be wetted and transferred to trucks for disposal at the on-site landfill. This material also could be loaded dry into pneumatic trucks or railcars for shipping to purchasers using a dustless load out. Emissions from the pneumatic loading into the fly ash silo will be controlled by a baghouse, and fugitive particulate emissions will occur during the transfer from the fly ash silo to trucks.

Bottom ash will be removed from the boiler after quenching and pneumatically transported into a bottom ash storage silo. From the bottom ash storage silo, the ash will be wetted and transferred to trucks for disposal at the on-site landfill. This material also could be loaded dry into pneumatic trucks or railcars for shipping to purchasers using a dustless load out. Emissions from the pneumatic loading into the bottom ash silo will be controlled by a baghouse, and fugitive particulate emissions will occur during the transfer from the bottom ash silo to trucks.

As an integral part of the wet scrubber system, quicklime will be delivered to the plant via trucks. The quicklime will be transferred pneumatically to a quicklime storage silo. The quicklime storage silo will have its own baghouse to control particulate emissions that occur during transfer operations. Quicklime from the storage silo is transferred pneumatically to the quicklime preparation building through an enclosed process. The quicklime is mixed with water and made into a slurry that will be injected into the wet flue gas desulfurization (FGD) system for $SO_2$ control. The quicklime slurry is then stored in tanks near the wet FGD system. From these tanks, the quicklime slurry is sent to the wet FGD system. This is a dustless operation.

Gypsum will be removed from the wet scrubber, dried, and conveyed to the gypsum storage silo. From the storage silo, the gypsum will be transferred to trucks or railcars for shipping to purchasers or wetted for disposal at the on-site landfill. Emissions from the loading into the gypsum silo will be controlled by a baghouse, and fugitive particulate emissions will occur during the transfer from the gypsum silo to trucks or railcars.

An activated carbon silo is proposed to provide storage capacity for activated carbon, which will act as part of a mercury/multi-pollutant control system. The activated carbon will be delivered to the plant via trucks. The activated carbon will be pneumatically transferred to the activated carbon storage silo, with particulate emissions that occur during transfer operations being controlled by a baghouse. The activated carbon will then be fed to the boiler flue gases via a conveyor and blower system. Particulate emissions occurring during the delivery of the activated carbon to the boiler will be controlled by the main boiler baghouse.

#### 8A.2.4.3 Process Cooling

The Heller-type hybrid cooling tower is used to minimize water consumption. A direct contact jet condenser will be used with a Heller dry cooling tower system. In this cooling system, the process steam from the steam turbine is fed to the condenser and condensed by direct cooling with the cooling water coming from the cooling cycle. The blended cooling water and condensate are collected in the hot-well and extracted by circulating water pumps. Approximately 3 percent of this flow – corresponding to the steam condensed – is fed to the boiler feed water system by condensate pumps. The major part of the flow is returned to the cooling tower for recooling. The cooling duty is performed by the cooling deltas, divided into parallel sectors, where cooling air flow is induced by a natural draft dry cooling tower.

When the ambient temperature is below 80°F, the cooling tower operates like a natural draft dry cooling tower. When the temperature exceeds 80°F, the facility has the option of applying water oversprays on the heating surfaces inside of the cooling tower to provide additional cooling. This type of cooling tower has no particulate emissions.

#### 8A.2.4.4 Ash Disposal Area

An on-site ash disposal area of approximately 150 acres will be used to dispose of fly ash, bottom ash and gypsum from the main boiler that will not be recycled. The fly ash, bottom ash, and gypsum will be mixed with water as it is unloaded from their respective silos into trucks, which will then transport the combustion by products to the ash disposal area located on the eastern portion of the property. The trucks will unload the by products in the active disposal area that will be limited to no more than 10 acres at any one time.

#### 8A.2.4.5 Storage Tank

One 1,060,000-gallon fuel oil storage tank; one 4,000-gallon fuel oil storage tank; one 1,000-gallon gasoline storage tank; two 14,000-gallon lube oil storage tanks; two 3,000-gallon lube oil storage tanks; a 1,000-gallon used oil storage tank; and one 300-gallon fuel oil storage tank will be located on-site. These tanks primarily will contain ultra low sulfur diesel to supply the auxiliary boilers, emergency generator, fire-water pump engine, and for startup of the PC fired boilers. There also is a gasoline tank for plant equipment and a lube oil sump for the main boilers and generators.

#### 8A.2.4.6 Construction Emissions

Based on guidance from BAPC, construction activities will be conducted under a separate Air Quality Operating Permit, since the PSD application addresses emissions that are not temporary.

## 8A.3 Dispersion Modeling Procedures

The suitability of an air quality dispersion model for a particular application is dependent upon several factors. For this study, several selection criteria were evaluated. These criteria are:

- Proposed or approved regulatory dispersion models and guidance;
- Availability of representative meteorological data;
- Land use analysis;
- Stack height relative to nearby structures; and
- Local terrain.

### 8A.3.1 Dispersion Model Selection

The United States Environmental Protection Agency (USEPA) has adopted a final rule (*Federal Register*, November 9, 2005) that replaces a standard air quality model that has been in place for over 25 years, the Industrial Source Complex (ISC) model, with a new model, AERMOD (USEPA 2004a). The rule became effective on December 9, 2005, and the ISC model was phased out as of December 9, 2006.

AERMOD is a refined dispersion model for simple and complex terrain for receptors within 50 km of a modeled source. The TEP used the promulgated version of AERMOD (Version 07026). AERMOD was used to assess air quality impacts in the local area for comparison to applicable air quality standards and PSD Class II increments. AERMOD was run with default model options in the CONTROL pathway. Meteorological processing procedures are discussed below.

### 8A.3.2 Meteorological Data

#### 8A.3.2.1 Meteorological Requirements for AERMOD

USEPA's current meteorological data input requirements for dispersion model applications for impacts in terrain above stack top ("complex terrain") are outlined in Sections 4.2 and 8.3 of Appendix W to 40 CFR 51 (Guideline on Air Quality Models ["Guideline"], see http://www.epa.gov/scram001/guidance/guide/appw_05.pdf). The Nevada BAPC recommends that site-specific meteorological data for heights up to and above stack top should be obtained for large projects such as the TEP. The next subsection summarizes the facility's meteorological data acquisition program.

### 8A.3.2.2 AERMET Data Processing

The AERMET (USEPA 2005a) meteorological pre-processor (Version 06341) was used to process data required for input to AERMOD. Boundary layer parameters used by AERMOD, which also are required as input to the AERMET processor, include albedo, Bowen ratio, and surface roughness. The land classifications and associated boundary layer parameters were determined following the guidelines provided by the USEPA AERMOD Implementation Guide (AIG) (USEPA 2005b). In accordance with the AIG, the input boundary layer parameters to AERMET were determined using one sector to a distance of 3 km from the meteorological monitoring station (as discussed in Section 8A3.2.5).

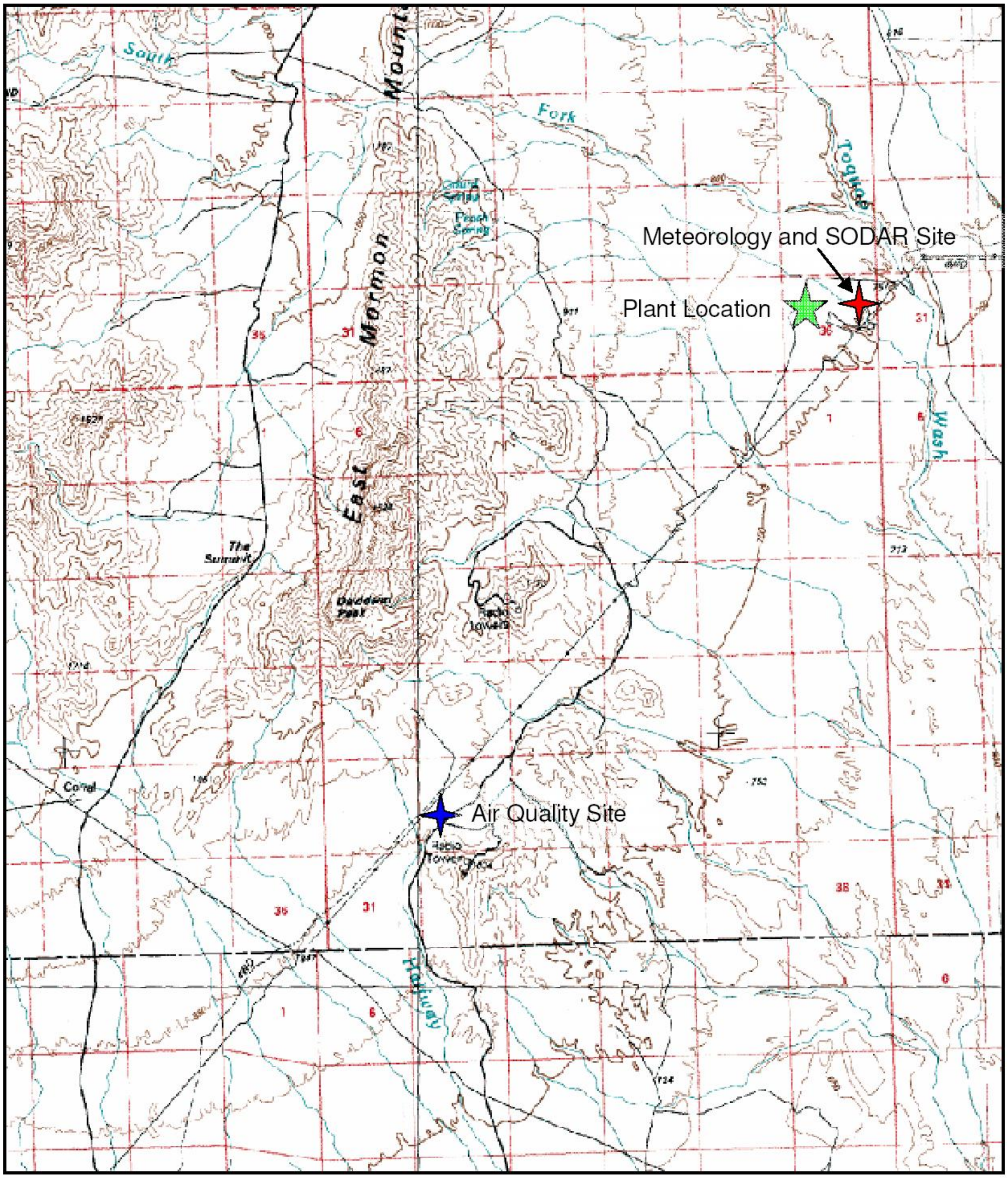
### 8A.3.2.3 Available Meteorological Data for AERMOD

The climate in the project area is typical of high continental deserts. Wind patterns in the valley are influenced primarily by two factors – the synoptic pattern and the valley itself, which imposes mountain and valley flows on the synoptic pattern. Local flows at levels near the ground exhibit a strong north/south pattern, consistent with the local valley orientation.

An on-site meteorological data monitoring program has been set up at the southeast corner of the proposed project site (see **Figure 8A-4**). The data was collected in accordance with a monitoring protocol that has been submitted to the Nevada BAPC. The monitoring program includes an instrumented 50-meter (m) meteorological tower and a Sonic Detection and Ranging (SODAR) profiler (see **Figure 8A-5**), with a backup SODAR used primarily for quality assurance purposes. The on-site meteorological data from the period of April 20, 2006, through April 30, 2007, is available and meets the USEPA's 90 percent data capture requirements (see **Table 8A-1**). Data collection extended beyond 1 year due to loss of power to the SODAR from May 10, 2006, to May 19, 2006, and loss of power to the tower from May 13, 2006, to May 19, 2006. The entire dataset from April 20, 2006, through April 30, 2007 was processed with AERMET. This extended dataset was used to assess modeled short-term impacts. However, annual impacts were assessed using a 365-day period that is a subset of hours from the extended dataset. The annual dataset covers the period of April 20, 2006 through April 19, 2007, which represents an 8,760-hour data capture equal to or better than any other contiguous 8760-hour data period in the 376-day total monitoring period.

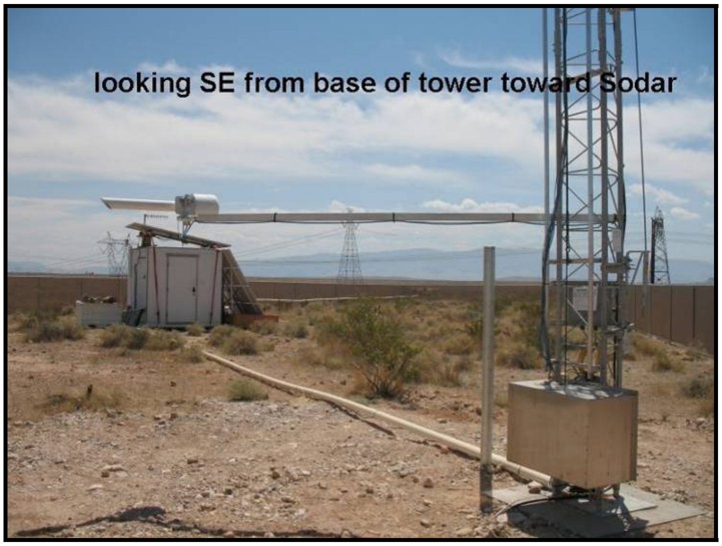
The upper air data for the modeled period was obtained from the Mercury Desert Rock Airport, Nevada (KDRA), twice-daily soundings.

**Figure 8A-4. Monitoring Sites Location Relative to the Proposed Project Site**




Project Location Air Quality Site Meteorology Site

**Figure 8A-5. Photograph of the On-Site SODAR Instrument and the Meteorological Tower**




## Table 8A-1
## Annual Data Recovery by Parameter

| Channel | Possible Hours (12 Months) | Valid Hours (12 Months) | Percent Recovery (12 Months) |
|---|---|---|---|
| 10WS | 8,760 | 8,620 | 98.4 |
| 10WD | 8,760 | 8,620 | 98.4 |
| 10ST | 8,760 | 8,620 | 98.4 |
| 50WS | 8,760 | 8,620 | 98.4 |
| 50WD | 8,760 | 8,620 | 98.4 |
| 50ST | 8,760 | 8,620 | 98.4 |
| 10 VWS | 8,760 | 8,620 | 98.4 |
| 50 VWS | 8,760 | 8,620 | 98.4 |
| 10SW | 8,760 | 8,620 | 98.4 |
| 50SW | 8,760 | 8,620 | 98.4 |
| 2mt | 8,760 | 8,620 | 98.4 |
| 10mt | 8,760 | 8,620 | 98.4 |
| 50mt | 8,760 | 8,620 | 98.4 |
| 10-2dt | 8,760 | 8,620 | 98.4 |
| 50-2dt | 8,760 | 8,620 | 98.4 |
| 10-2dt/8 | 8,760 | 8,620 | 98.4 |
| 50-2dt/53 | 8,760 | 8,620 | 98.4 |
| RH% | 8,760 | 8,631 | 98.5 |
| Sol w/m$^2$ | 8,760 | 8,610 | 98.3 |
| Precipitation | 8,760 | 8,626 | 98.5 |
| Pressure | 8,760 | 8,631 | 98.5 |
| $SO_2$ | 8,760 | 8,059 | 92.0 |
| NO | 8,760 | 8,091 | 92.4 |
| $NO_X$ | 8,760 | 8,091 | 92.4 |
| $NO_2$ | 8,760 | 8,091 | 92.4 |
| $O_3$ | 8,760 | 8,146 | 93.0 |
| $PM_{10}$ | 60 | 59 | 98.3 |
| TSP | 60 | 59 | 98.3 |
| SODAR* | 8,760 | 8,227 | 93.9 |

*SODAR data recovery represents combined data for which at least 3 reporting levels constitutes a valid hour.

For parameters not observed by the on-site meteorological instrumentation, such as cloud cover, hourly observations were taken from St. George, Utah (KSGU). The primary reason for selecting St. George for cloud cover data is proximity to the meteorology site. St. George airport is about 40 miles east of the monitoring site. The next closest candidate is Nellis Air Force Base (AFB), but it is much further away (about 70 miles southwest of the site). Elevation is another factor in the selection of the cloud cover site. The Nellis AFB elevation is about 2,000 feet, while the site elevation is about 2,800 feet and St. George is at 2,880 feet. The Mormon Mountains, with elevations above 7,400 feet, lie west of the monitoring site. The Mormon Range in Utah lies west of St. George.

We also reviewed National Oceanographic and Atmospheric Administration (NOAA) Climate Atlas data such as isopleths of annual mean sunshine hours, annual mean clear days, and cloudy days (see **Appendix 8A-1**) that corroborates our use of St. George, Utah, as a representative site for cloud cover observations. Further discussion of this and other comments of the NDEP on the initial PSD application submittal are provided in **Appendices 8A-2** and **8A-3**.

The St. George cloud cover data was input to AERMET as an external surface file in AERMET's Stage 1 input. The file format used was National Climatic Data Center's (NCDC's) TD-3505 variable length (also referred to as Integrated Surface Hourly or ISH).

The USEPA and Nevada monitoring guidance (USEPA 2000; NDEP 2003) requires meteorological data capture rates to meet or exceed 90 percent and for the ambient air quality data capture rates to meet or exceed 80 percent. The 12-month period of ambient data reported to the NDEP covers the period April 2006 through March 2007, while the 13-month period of meteorological data reported to the NDEP covers the period April 2006 through April 2007. The valid data recovery percentages for both the fixed-tower and SODAR measurements from the meteorological monitoring site are above this 90 percent data capture requirement (see **Table 8A-1**). Tables of percent recovery for each measured parameter by quarter are presented in the appendix of monitoring reports sent to NDEP. The modeling period for short-term averages has added an 11 extra days beyond a full year (376 days, from April 20, 2006, through April 30, 2007) to further enhance the data capture beyond that reported in **Table 8A-1**. As noted above, some data was lost during a few days in May 2006 due to a power failure that affected the tower and SODAR for a portion of an 11-day period (May 9 through 19). However, data for the period May 9 through May 19, 2006, is included in the modeling database because a significant portion of that period had at least tower data available.

#### 8A.3.2.4 Quality Assurance of On-site Meteorological Data

The input to the AERMOD model consisted of on-site meteorological parameters listed in **Table 8A-2**. Wind speed and wind direction values from each tower and SODAR measurement height have been graphically plotted and then visually inspected for reasonableness and consistency. Data values that showed a large deviation from those of neighboring values in height and time were subject to disqualification after examination by experienced meteorologists. The computer modeling archive contains images of the wind fields for every day of the monitoring data.

**Table 8A-2**
**List of On-Site Meteorological Measurements**

| Measurement Height (m) | Measured Parameters | | | | | |
|---|---|---|---|---|---|---|
| | WD | WS | Temperature | Sigma Theta | Sigma W | Solar Radiation |
| 2 | N/A | N/A | x | N/A | N/A | x |
| 10 | x | x | x | x | x | N/A |
| 50 | x | x | x | x | x | N/A |
| 75 | x | x | N/A | N/A | x | N/A |
| 100 | x | x | N/A | N/A | x | N/A |
| 125 | x | x | N/A | N/A | x | N/A |
| 150 | x | x | N/A | N/A | x | N/A |
| 175 | x | x | N/A | N/A | x | N/A |
| 200 | x | x | N/A | N/A | x | N/A |
| 225 | x | x | N/A | N/A | x | N/A |
| 250 | x | x | N/A | N/A | x | N/A |
| 275 | x | x | N/A | N/A | x | N/A |
| 300 | x | x | N/A | N/A | x | N/A |
| 325 | x | x | N/A | N/A | x | N/A |
| 350 | x | x | N/A | N/A | x | N/A |
| 375 | x | x | N/A | N/A | x | N/A |
| 400 | x | x | N/A | N/A | x | N/A |
| 425 | x | x | N/A | N/A | x | N/A |
| 450 | x | x | N/A | N/A | x | N/A |
| 500 | x | x | N/A | N/A | x | N/A |

N/A - no measurements were taken at that level.
x - measurements were taken at that level.

Plots of the wind roses for the 10-m (tower) and 225-m (SODAR) levels are provided in **Figures 8A-6** and **8A-7**, respectively, for a "Full Day" (meaning all hours of the day were plotted, not just daytime or nighttime). These plots show that a pronounced low-level nocturnal drainage flow from the north-northwest at the 10-m level is largely absent at the 225-m level, which would be expected given the nature of the surrounding terrain. Wind roses for the same levels for the daytime hours (7 am – 6 pm) and nighttime hours (7 pm – 6 am) and for four seasons also were plotted (see **Appendix 8A-1**).

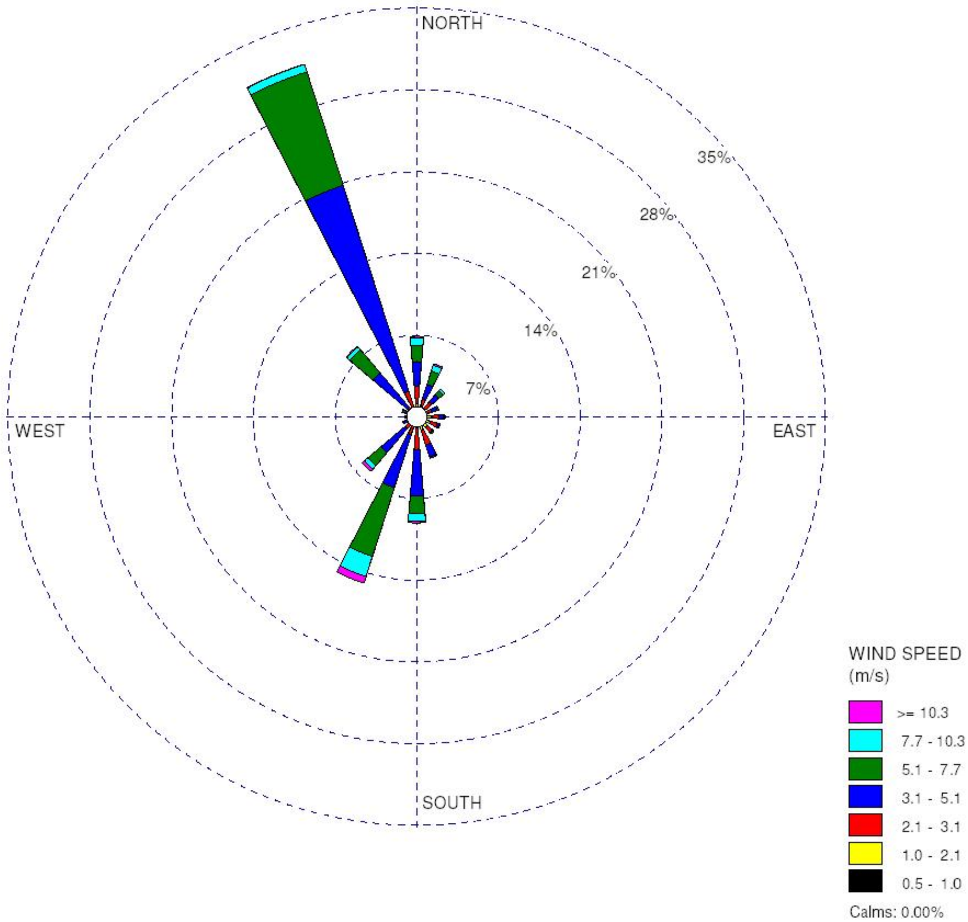
## Figure 8A-6. On-Site Data Wind Rose at 10-M Level

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower -Full Day Plot**
**4/20/2006 - 4/30/2007 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




| COMMENTS: | | COMPANY NAME: | |
|---|---|---|---|
| Plot represents the 10 meter level for all hours of the day. | | **Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER: **M. Stresing** | ENSR AECOM |
| | CALM WINDS: **0.00%** | TOTAL COUNT: **8892 hrs.** | |
| | AVG. WIND SPEED: **4.49 m/s** | DATE: **6/26/2007** | PROJECT NO.: **10784-004-200** |

WRPLOT View - Lakes Environmental Software

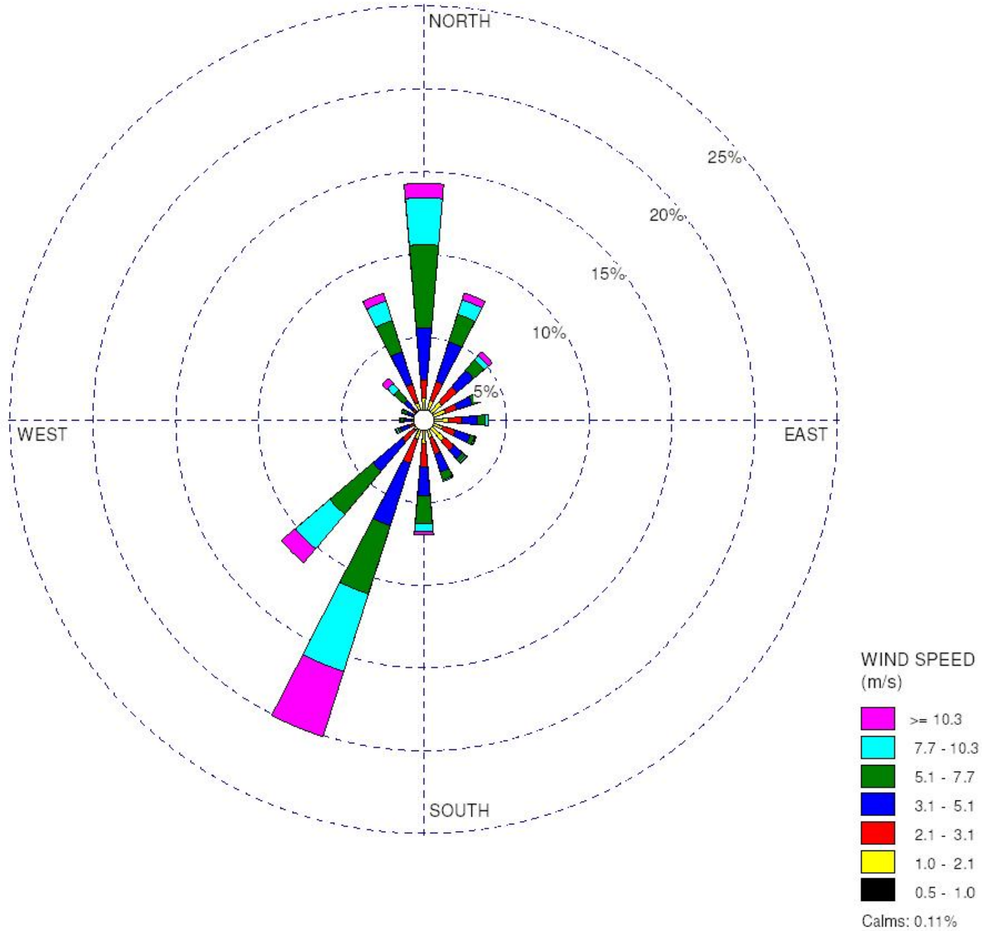
## Figure 8A-7. On-Site Data Wind Rose at 225-M Level

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Full Day Plot**
**4/20/2006 - 4/30/2007 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 225 meter level for all hours of the day. | | COMPANY NAME:<br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br>**M. Stresing** | ENSR \| AECOM |
| | CALM WINDS:<br>**0.11%** | TOTAL COUNT:<br>**6315 hrs.** | |
| | AVG. WIND SPEED:<br>**5.31 m/s** | DATE:<br>**6/26/2007** | PROJECT NO.:<br>**10784-004-200** |

WRPLOT View - Lakes Environmental Software

### 8A.3.2.5 Meteorological Site Land Use Characteristics

Meteorological data required as input to the AERMOD model consists of hourly values of wind speed, wind direction, and ambient temperature taken at one or more levels. Due to the tall stack emissions planned for the Toquop project and the terrain influences in the area, ENSR took meteorological measurements using a tall tower plus a Doppler SODAR. These multiple-level measurements were input to AERMET and were provided to AERMOD in the “PROFILE” file. Internally, AERMOD computes profiles of wind, temperature, and turbulence up to 5,000 m above the ground. Since the measurements do not cover this vertical range, AERMOD computes the required vertical profiles based upon an optimum combination of measured data and theoretical/ semi-empirical profiles. The theoretical profiles are based upon atmospheric boundary layer dispersion theory, for which additional boundary layer parameters are required. These additional parameters include sensible heat flux, surface friction velocity, convective velocity scale, vertical potential temperature gradient, convective and mechanical mixing heights, and Monin-Obukhov length. The convective mixing heights are derived from morning upper air soundings in conjunction with heat flux estimates computed within AERMET. AERMET also uses land use surface characteristics, such as surface roughness length, Bowen ratio, and albedo, to compute these parameters, and the results are provided to AERMOD in the “SURFACE” file.

A review of topographic maps and photographs of the area surrounding the meteorological tower shows that the area around the site consists of one type of vegetation – desert shrubland. Desert shrubland is defined as desert salt scrub habitat consisting of mixed shrubland communities, greasewood, shadscale, saltbrush, sagebrush, and rabbitbrush. The University of Idaho website (http://www.cnrhome.uidaho.edu/default.aspx?pid=85873) provides a description of the desert shrubland. **Figures 8A-2**, **8A-3**, and **8A-5** show photographs of the surrounding area. **Figure 8A-8** shows the location of the tower and the surrounding area (to 3 km) on a topographic map.

**Figure A8-9** was created from the U.S. Geological Survey (USGS) land use and land cover grid data files (http://edcftp.cr.usgs.gov/pub/data/LULC/250K/). This figure shows that the on-site tower falls in the USGS land use classification type of 31 to 33, which could be any of the following sub-categories: herbaceous rangeland (31), shrub and brush rangeland (32), or mixed rangeland (33). The 52-category USGS land use classification system can be found at http://courses.washington.edu/urbdp467/html/classify.html

The 3-km radial area surrounding the meteorological site has a uniform land use. Monthly land use characteristics used for AERMET processing were based on the land-use classifications of the entire 3-km radial area being desert shrubland. The land use sector classification was conducted by inspecting topographic maps within a 3-km radial area centered on the met tower (as shown in **Figure 8A-8**). The seasonal values for each land classification are provided in the AERMET user’s guide (USEPA 2004b) and are summarized in **Tables 8A-3** through **8A-5**.

**Figure 8A-8. Land Use Within 3-km of the Meteorological Site**

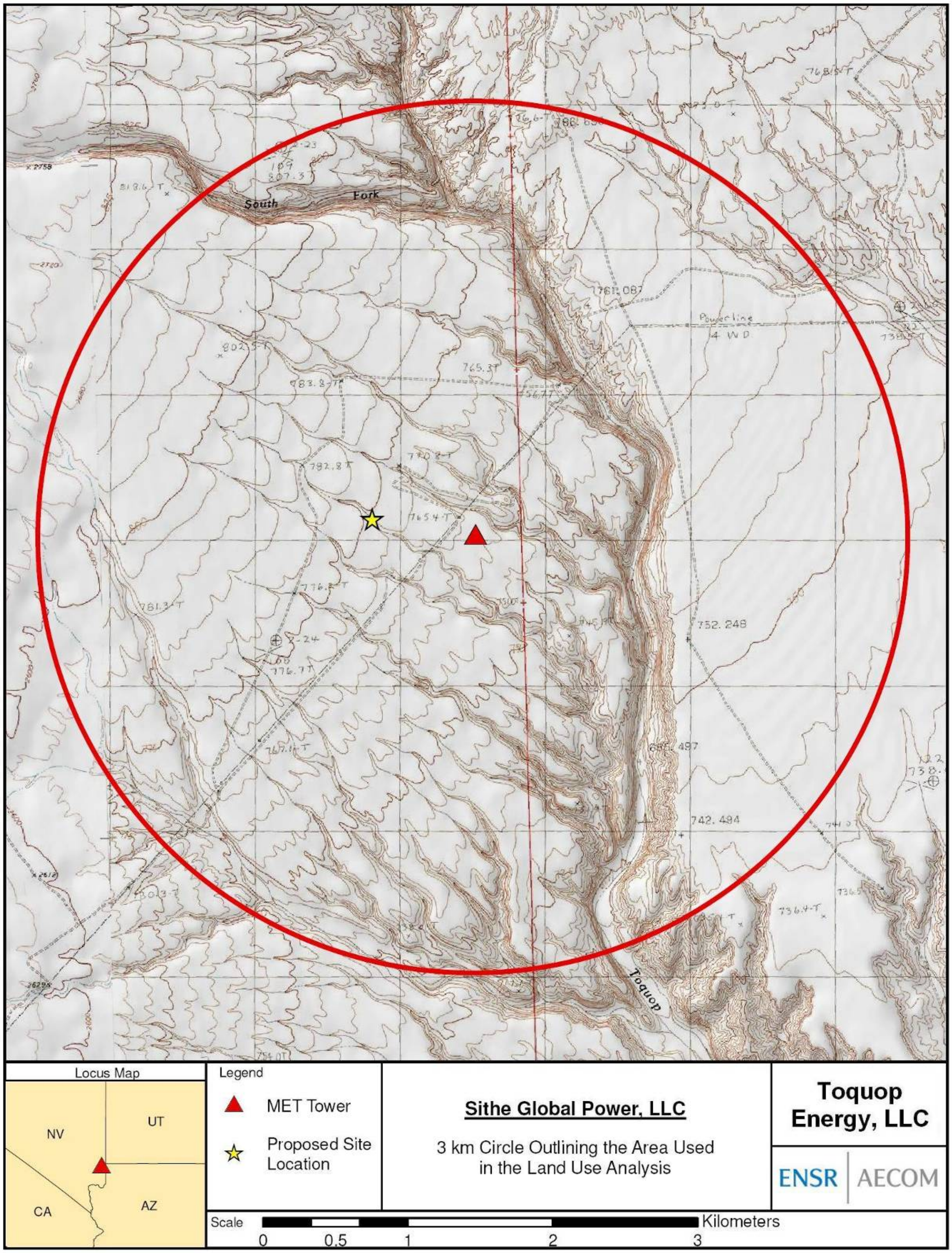


**Figure 8A-9. Depiction of the USGS Land Use Around the Met Tower**

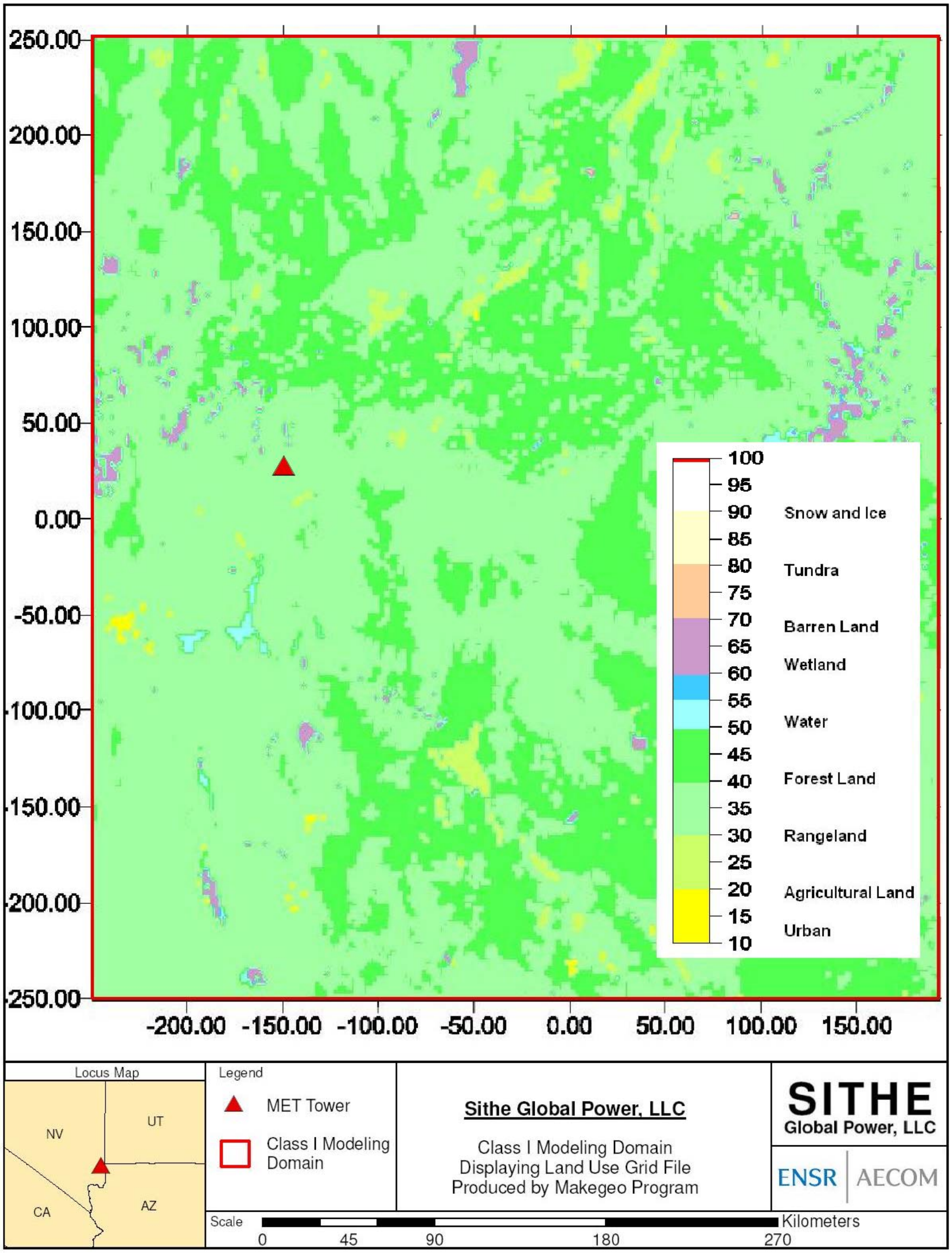


**Table 8A-3**
**Seasonal Albedo Values – From the AERMET User's Guide**

| Land-Use Type | Spring | Summer | Autumn | Winter |
|---|---|---|---|---|
| Water | 0.12 | 0.10 | 0.14 | 0.20 |
| Deciduous | 0.12 | 0.12 | 0.12 | 0.50 |
| Coniferous | 0.12 | 0.12 | 0.12 | 0.35 |
| Swamp | 0.12 | 0.14 | 0.16 | 0.30 |
| Cultivated Land | 0.14 | 0.20 | 0.18 | 0.60 |
| Grassland | 0.18 | 0.18 | 0.20 | 0.60 |
| Urban | 0.14 | 0.16 | 0.18 | 0.35 |
| Desert Shrub Land | 0.30 | 0.28 | 0.28 | 0.45 |

**Table 8A-4**
**Seasonal Surface Roughness Values – From the AERMET User's Guide**

| Land-Use Type | Spring | Summer | Autumn | Winter |
|---|---|---|---|---|
| Water | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Deciduous | 1.00 | 1.30 | 0.80 | 0.50 |
| Coniferous | 1.30 | 1.30 | 1.30 | 1.30 |
| Swamp | 0.20 | 0.20 | 0.20 | 0.05 |
| Cultivated Land | 0.03 | 0.20 | 0.05 | 0.01 |
| Grassland | 0.05 | 0.10 | 0.01 | 0.001 |
| Urban | 1.00 | 1.00 | 1.00 | 1.00 |
| Desert Shrub Land | 0.30 | 0.30 | 0.30 | 0.15 |

**Table 8A-5**
**Seasonal Bowen Ratio Values – From the AERMET User's Guide**

| Land-Use Type | Average | | | | Dry | | | | Wet | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Spring | Summer | Autumn | Winter | Spring | Summer | Autumn | Winter | Spring | Summer | Autumn | Winter |
| Water | 0.1 | 0.1 | 0.1 | 1.5 | 0.1 | 0.1 | 0.1 | 2.0 | 0.1 | 0.1 | 0.1 | 0.3 |
| Deciduous | 0.7 | 0.3 | 1.0 | 1.5 | 1.5 | 0.6 | 2.0 | 2.0 | 0.3 | 0.2 | 0.4 | 0.5 |
| Coniferous | 0.7 | 0.3 | 0.8 | 1.5 | 1.5 | 0.6 | 1.5 | 2.0 | 0.3 | 0.2 | 0.3 | 0.3 |
| Swamp | 0.1 | 0.1 | 0.1 | 1.5 | 0.2 | 0.2 | 0.2 | 2.0 | 0.1 | 0.1 | 0.1 | 0.5 |
| Cultivated Land | 0.3 | 0.5 | 0.7 | 1.5 | 1.0 | 1.5 | 2.0 | 2.0 | 0.2 | 0.3 | 0.4 | 0.5 |
| Grassland | 0.4 | 0.8 | 1.0 | 1.5 | 1.0 | 2.0 | 2.0 | 2.0 | 0.3 | 0.4 | 0.5 | 0.5 |
| Urban | 1.0 | 2.0 | 2.0 | 1.5 | 2.0 | 4.0 | 4.0 | 2.0 | 0.5 | 1.0 | 1.0 | 0.5 |
| Desert Shrub Land | 3.0 | 4.0 | 6.0 | 6.0 | 5.0 | 6.0 | 10.0 | 10.0 | 1.0 | 1.5 | 2.0 | 2.0 |

Monthly albedo, surface roughness, and Bowen ratio based on the land classifications for the above sector were calculated. The Bowen ratio depends on moisture conditions. ENSR researched available historical precipitation data in the area. The purpose of using a nearby, long-term monitoring site for precipitation is to provide a clear comparison of the monitoring period precipitation to a representative precipitation climatology for the area. The nearest station with representative precipitation data is in Overton, Nevada. The Overton average total precipitation for the period of 7/1/1948 to 12/31/2006 was obtained from the Western Regional Climate Center http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv5846. Monthly precipitation data for 2006 also was obtained from the Western Regional Climate Center. However, monthly precipitation data for 2007 was not yet available from this site at the time of the modeling, so we obtained the data from NOAA (http://cdo.ncdc.noaa.gov/ancsum/ACS). The monthly data is provided in the modeling archive. The Overton site is a representative available source of precipitation data for the proposed project location due to its close proximity to the site and the lack of significant intervening terrain between TEP and Overton.

The input Bowen ratio was determined by comparing the monthly total precipitation measured in Overton during April, 2006 to April 2007 with the climatology of monthly 58-year average precipitation totals in Overton. If the corresponding monthly total precipitation during the 2006 to 2007 period was below 50 percent of the climatological average, then the month was assumed to be drier than normal. If the corresponding monthly total precipitation during the 2006 to 2007 period was greater than 200 percent of the climatological average, then the month was assumed to be wetter than normal. Observed corresponding monthly precipitation during 2006 to 2007 that was in between 50 and 200 percent of climatological monthly average was assumed to be near-normal. This approach for determining wet, dry, and normal moisture conditions is consistent with guidance developed by USEPA for the CTDMPLUS meteorological pre-processor, METPRO, from which AERMET was developed. **Table 8A-6** notes the moisture characterization selected for each modeled month.

**Table 8A-6**
**Selected Seasonal Values for AERMET Processing and Monthly Moisture for Bowen Ratio**

| **Precipitation (inches) Amount at Overton Airport, Nevada** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** |
| **1948 to 2006** | | | | | | | | | | | |
| 0.57 | 0.68 | 0.47 | 0.34 | 0.13 | 0.07 | 0.31 | 0.27 | 0.34 | 0.33 | 0.48 | 0.45 |
| **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** |
| **2007** | **2007** | **2007** | **06-07*** | **2006** | **2006** | **2006** | **2006** | **2006** | **2006** | **2006** | **2006** |
| 0.25 | 0.34 | 0.00 | 0.02 | 0.00 | 0.14 | 1.18 | 0.03 | 0.55 | 1.38 | 0.00 | 0.10 |
| Dry | Ave | Dry | Dry | Dry | Ave | Wet | Dry | Ave | Wet | Dry | Dry |

Note: In April 2006, precipitation was equal to 0.0'' and in April 2007 it was 0.02''. Therefore, conditions are dry for both April 2006 and April 2007.

In addition to the Bowen ratio varying based on moisture conditions, each land use parameter needed by AERMET varies on a seasonal basis. For this application, the mapping of each month for each season is shown in **Table 8A-7**. The monthly land use characteristics as shown in **Table 8A-7** were used in AERMET.

**Table 8A-7**
**Monthly Input Boundary Layer Parameters to AERMET**

| Year | Month | Season | Moisture Assumption | Albedo | Bowen | $Z_0$ |
|---|---|---|---|---|---|---|
| 2007 | January | Autumn | Dry | 0.28 | 10.00 | 0.30 |
| 2007 | February | Autumn | Average | 0.28 | 6.00 | 0.30 |
| 2007 | March | Spring | Dry | 0.30 | 5.00 | 0.30 |
| 2006-2007 | April | Spring | Dry | 0.30 | 5.00 | 0.30 |
| 2006 | May | Summer | Dry | 0.28 | 6.00 | 0.30 |
| 2006 | June | Summer | Average | 0.28 | 4.00 | 0.30 |
| 2006 | July | Summer | Wet | 0.28 | 1.50 | 0.30 |
| 2006 | August | Summer | Dry | 0.28 | 6.00 | 0.30 |
| 2006 | September | Summer | Average | 0.28 | 4.00 | 0.30 |
| 2007 | October | Summer | Wet | 0.28 | 1.50 | 0.30 |
| 2007 | November | Autumn | Dry | 0.28 | 10.00 | 0.30 |
| 2007 | December | Autumn | Dry | 0.28 | 10.00 | 0.30 |

### 8A.3.3 Good Engineering Practice Stack Height Analysis

A GEP stack height analysis was performed to determine the potential for building-induced aerodynamic downwash for each of the modeled point sources. The analysis procedures described in USEPA's Guidelines for Determination of Good Engineering Practice Stack Height (USEPA 1985), Stack Height Regulations (40 CFR 51), and current model clearinghouse guidance was used.

The GEP formula height is based on the observed phenomena of disturbed atmospheric flow in the immediate vicinity of a structure resulting in higher ground level concentrations at a closer proximity to the building than would otherwise occur. It identifies the minimum stack height at which significant aerodynamics (downwash) are avoided. The GEP formula stack height, as defined in the 1985 final regulations, is calculated from:

$H_{GEP} = H_{BLDG} + 1.5L$

where:

$H_{GEP}$ is the maximum GEP stack height;

$H_{BLDG}$ is the height of the nearby structure; and

L is the lesser dimension (height or projected width) of the nearby structure.

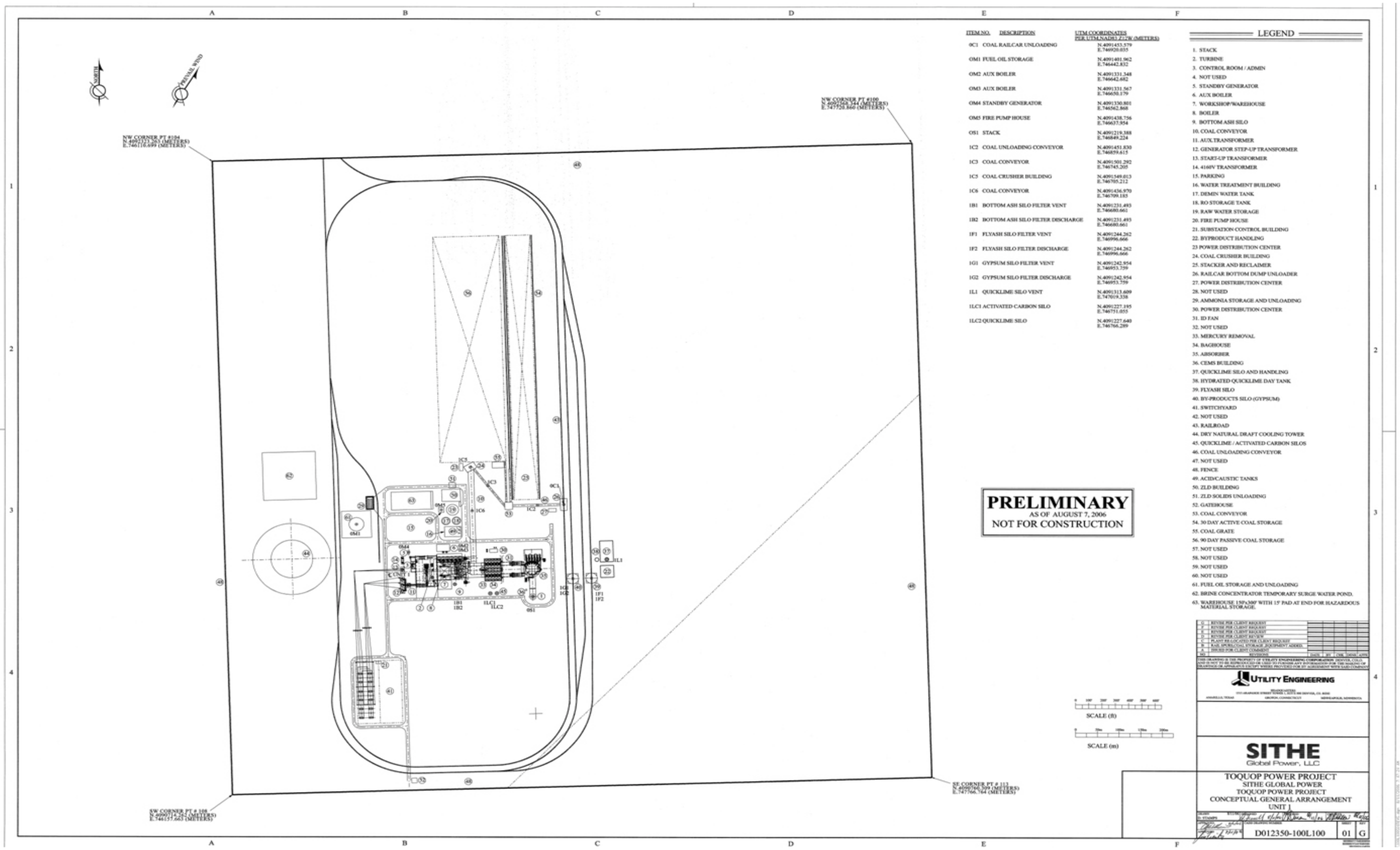
Both the height and width of the structure are determined from the frontal area of the structure projected onto a plane perpendicular to the direction of the wind. In all instances, the GEP stack height is based on the plane projections of any nearby building which results in the greatest justifiable height. For purposes of the GEP analysis, “nearby” refers to the “sphere of influence,” defined as five times the height or width of the building, whichever is less, downwind from the trailing edge of the structure. In the case where a stack is not influenced by nearby structures, the maximum GEP stack height is defined as 65 m.

**Figure 8A-10** is a plot plan showing the locations of the power plant facilities and cooling tower stacks, and structures that could potentially produce aerodynamic downwash of the plumes. Given the close proximity of the plant structures to the stack, these structures potentially produce the largest downwash effect. The proposed site will be graded to an approximately level surface; therefore, all the building and stack base elevations were set at the same value. There are no existing buildings or structures outside the proposed plant site that need to be considered in determining downwash.

The direction-specific building dimensions were determined using the latest version of USEPA’s Building Profile Input Program software (BPIP PRIME Dated 04274) using the design values of the stack and building heights.

For this modeling exercise, the GEP formula stack height was determined by running BPIP. The GEP formula stack height is equivalent to 733 feet. This height is determined by a combined building structure encompassing the boiler building and the tripper room. The height of this combined structure is 330 feet while the maximum projected width is 268.7 feet. According to the GEP formula above, these building dimensions would results in a GEP formula of: 330 feet + 1.5x268.7 feet = 733 feet. The stack was modeled at a design height of 730 feet, nearly equivalent to GEP.

## Figure 8A-10. Simplified Plot Plan and the Structures Used in the GEP Analysis



Electronic BPIP files with horizontal and lateral building dimensions digitized in a Universal Transverse Mercator (UTM) coordinates system (Zone 11 – North American Datum 1983 [NAD83]) are provided with the PSD permit application in the computer modeling archive.

### 8A.3.4 Building Cavity Analysis

AERMOD's inclusion of the PRIME downwash algorithm automatically takes care of the cavity region, which is generally about three building heights downwind. No additional analysis (e.g., using SCREEN3) is necessary since AERMOD is used for the local impact modeling.

### 8A.3.5 Local Topography and Receptor Selection

Local topography plays an important role in the selection of the appropriate dispersion model. Available dispersion models were formerly divided into two general categories: those applicable to terrain that is below stack top (simple terrain) and those applicable where the terrain is above stack top (complex terrain). However, AERMOD removes this distinction and allows a seamless treatment of project impacts on terrain both above and below stack top elevation. The project location will be at an elevation of approximately 2,550 feet above msl. The terrain within approximately 8 km of the facility includes a steep ridge (East Mormon Mountains) to the southwest of the plant site, which reaches over 5,200 feet above msl with additional peaks reaching 5,800 feet above msl approximately 14 km to the west.

#### 8A.3.5.1 Local Area Receptors

The proposed facility location is identified by the coordinates of the main stack: 746,849 m Easting and 4,091,219 m Northing (UTM Zone 11, NAD83). The Class II area receptor grid is shown in **Figure 8A-11**. **Figure 8A-12** shows a close-in look at the receptors within a few kilometers of the facility fenceline. Receptors were placed in the Class II domain as described below:

- Fenceline receptors spaced at 30-m (100-foot) intervals;
- 100-m spacing from the fenceline to 2 km;
- 500-m spacing from 2 km to 5 km;
- 1,000-m spacing from 5 km to 10 km; and
- 2,000-m spacing from 10 km to 20 km.

Additional receptors for providing good concentration resolution on nearby high terrain areas were placed on the East Mormon Mountains and on the southern part of the Tule Springs Hill at 250-m spacing.

## Figure 8A-11. AERMOD Receptor Grid

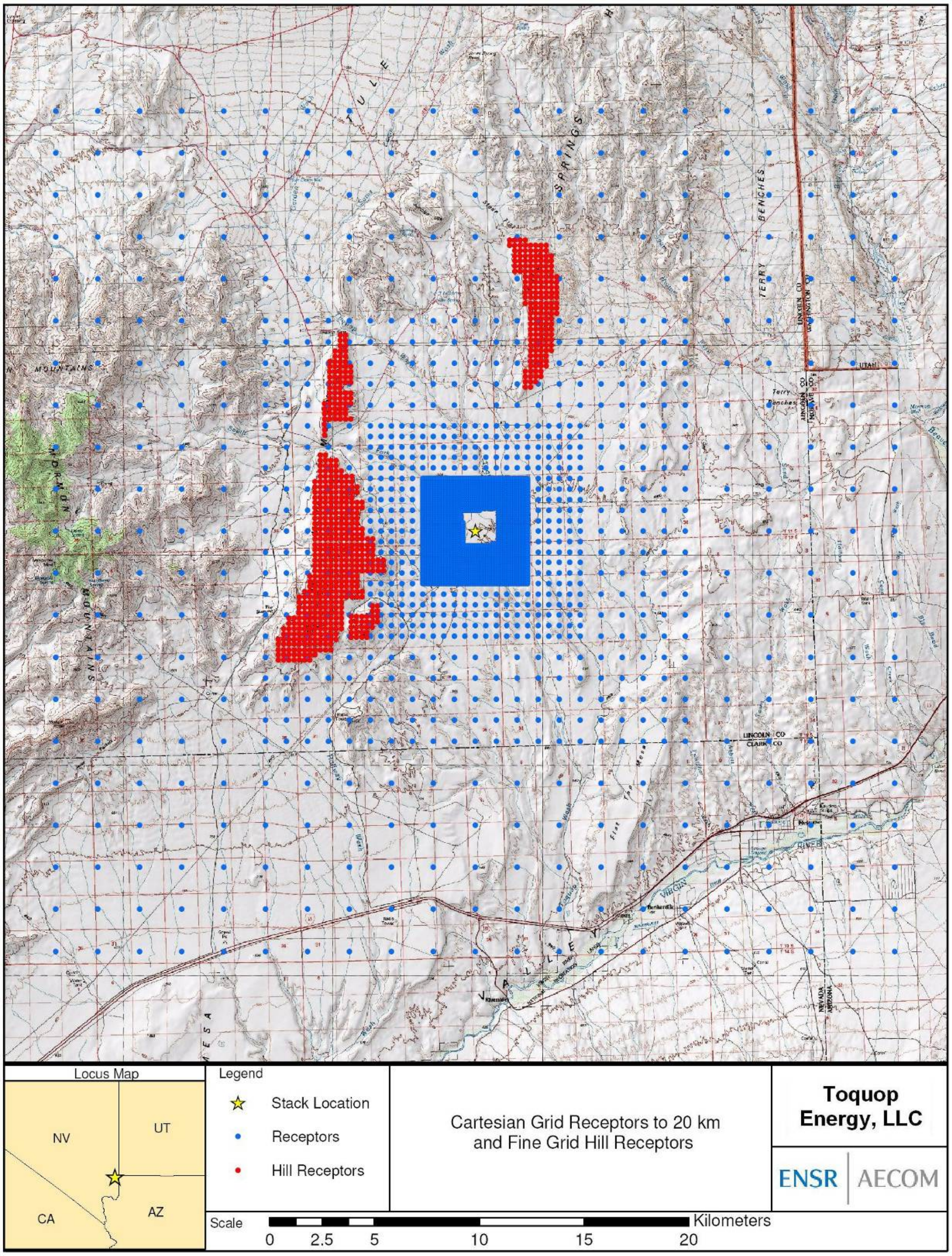
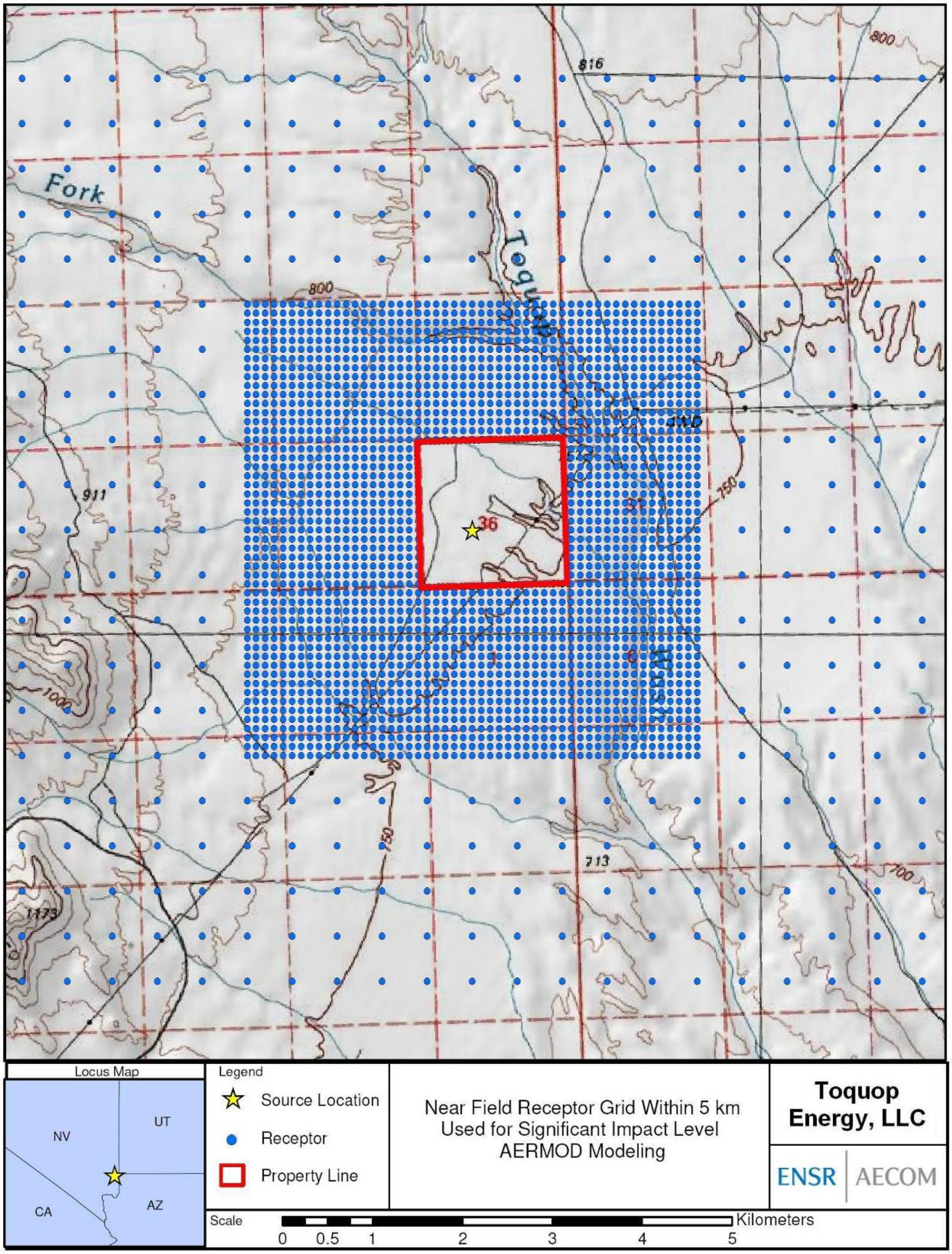


**Figure 8A-12. Close-in View of AERMOD Receptor Grid**



This receptor grid was used for determining the project's status of significant/insignificant for each of the criteria pollutant/averaging periods and for the cumulative modeling analysis. Depending upon the locations of the peak predicted concentrations, a separate model run using 100-m grid spacing was made, if necessary, to calculate impacts near the receptor areas that exceed 75 percent of the significant impact level (SIL) or other applicable standard. No additional receptors were added because the results of the SIL analysis for each pollutant or averaging period that the project modeled insignificant impacts were already within 100-m spaced receptors or were less than 75 percent of their respective SIL.

The proposed facility's property-boundary fence will consist of a physical barrier to which access by the public will be restricted.

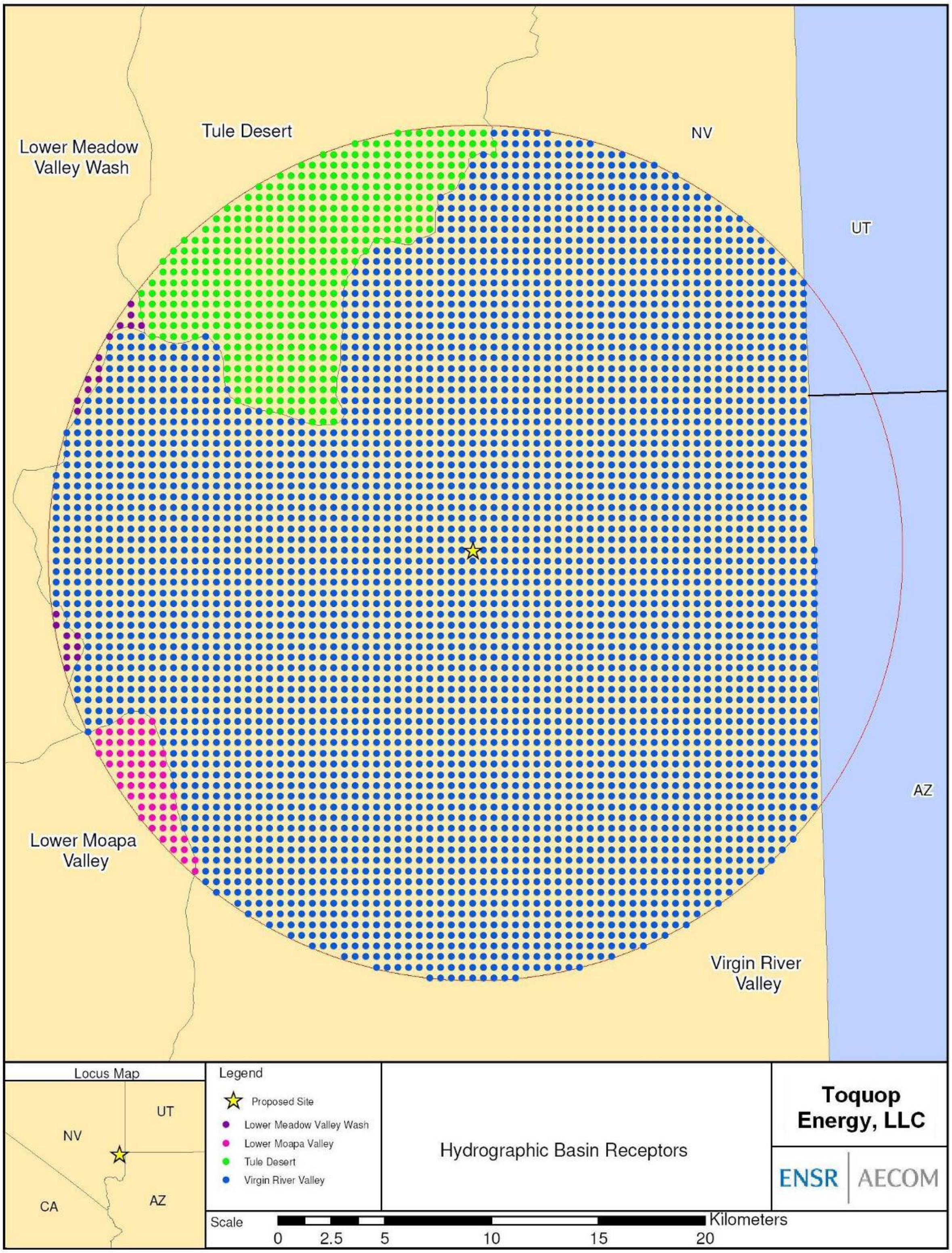
#### 8A.3.5.2 Hydrographic Basin Receptors

Hydrographic basin receptors were placed out to 20 km from the main project stack at 500-m spacing within each affected hydrographic basin. The peak impacts in each hydrographic basin are provided in this appendix. **Figure 8A-13** is a map of the hydrographic basins and their receptor grids that were included in the modeling.

#### 8A.3.5.3 Terrain Processing (AERMAP)

AERMOD was designed to handle all types of terrain from flat to complex. To model the terrain within the modeling domain for the project site, AERMOD requires additional information about the surrounding terrain. This information includes a height scale (or critical hill height) and a base elevation for each receptor. This information is output from AERMOD's terrain preprocessor, AERMAP. Version 04300 was used in lieu of the more recent version 06341 due to an unresolved issue in the new AERMAP version with receptors in the vicinity of UTM zone boundaries. The latest version of AERMAP does not handle the Digital Elevation Model (DEM) files seamlessly, so with that version, there would be gaps in the terrain data near the UTM zone borders. The eastern side of the receptor grid used in this modeling lies on the border of UTM zones 11 and 12. Because of the above issue, version 06341 was not run with this receptor grid. Rather than eliminate a portion of the receptor grid, AERMAP version 04300 was used to process the elevations and critical hill heights. AERMAP requires DEM data from the USGS. The required DEM data corresponds to 7.5-minute native format. Receptor locations were processed with AERMAP prior to running the AERMOD analyses. The DEM data for the project area correspond to NAD27; therefore, AERMAP was run with the appropriate processing option to accommodate receptors in NAD83 and DEM data in NAD27. The electronic DEM files used to run AERMAP are being provided with the PSD permit application submittal.

**Figure 8A-13.  Nevada Hydrographic Basins**



### 8A.3.6 Background Air Quality Data

Background air quality data are required for comparison of the TEP impacts with the Nevada and National AAQS (NAAQS). Background air quality concentrations were monitored concurrent with the on-site meteorological data. These background values were added to the modeled maximum impacts to obtain estimates of total ambient air quality concentrations for comparison to the NAAQS. At present, there are no major sources of criteria pollutants near the project site, so background concentrations measured on-site should be representative for the entire area.

The following pollutants have been measured at the on-site station:

- $NO_X$, nitric oxide, and nitrogen dioxide ($NO_2$);
- $SO_2$;
- Ozone ($O_3$);
- Particulate Matter ($PM_{10}$); and
- Lead (Pb).

**Table 8A-8** lists the highest monitored background concentrations corresponding to observed data collected at the on-site monitoring station during the baseline period. All short-term average concentrations (i.e., 1-, 3-, 8-, and 24-hour) represent the maximum concentration measured during the April 2006 through May 2007 period (13 months). Long-term average concentrations listed in the table represent a 12-month average (April 2006 – March 2007).

**Table 8A-8**
**Highest Monitored Background Concentrations**

| Pollutant | Averaging Period | Concentration ($\mu g/m^3$) |
|---|---|---|
| $NO_2$ | Annual | 6.9 |
| $SO_2$ | 3-Hour | 28.0 |
| | 24-Hour | 19.1 |
| | Annual | 6.6 |
| $PM_{10}$ | 24-Hour | 41.0 |
| | Annual | 8.9 |
| $O_3$ | 1-Hour | 155 |
| | 8-Hour | 140 |
| Pb | Quarterly | 0.0027 |

A source may be allowed an exemption from the pre-construction monitoring program for a given pollutant if the ambient impacts are less than the de minimis levels established by the USEPA (see **Table 8A-9**), or if existing data are representative of the air quality near the site. The monitoring program near the proposed site had omitted carbon monoxide (CO) measurements in the expectation that the modeled concentrations would be below the values listed in this table. Predicted project impacts are further discussed in Section 8A-5 and indicate that only $PM_{10}$ modeled results from the proposed project exceed the tabulated PSD monitoring threshold concentrations.

**Table 8A-9**
**PSD Monitoring Threshold Concentrations**

| Pollutant | Averaging Period | Threshold Concentration (µg/m³) |
|---|---|---|
| CO | 8-hour | 575 |
| $NO_2$ | Annual | 14 |
| $SO_2$ | 24-hour | 13 |
| $PM/PM_{10}$ | 24-hour | 10 |
| $O_3$ | NA | -.-[1] |
| Lead | 3-month | 0.1 |
| Fluorides | 24-hour | 0.25 |
| Total Reduced Sulfur | 1-hour | 10 |
| Reduced Sulfur Compounds | 1-hour | 10 |
| Hydrogen Sulfide | 1-hour | 0.2 |

[1] Exempt if volatile organic compound (VOC) emissions are less than 100 tons per year (tpy).

### 8A.3.7 Post-Processing of $NO_X$ Impacts

Post-processing of model-predicted impacts was considered for $NO_2$ impacts only. According to USEPA's modeling guidelines (Appendix W), a first tier assumption is to assume that 100 percent of $NO_X$ emissions are in the form of $NO_2$. In a refined tier 2 analysis, it may be assumed that 75 percent of the predicted ambient $NO_X$ concentrations will be in the form of $NO_2$.

## 8A.4 Characterization of Emissions for Modeling

Maximum annual criteria pollutant emission rates for the proposed project sources are summarized in **Table 8A-10**. The 750 MW supercritical pulverized coal-fired boiler is the primary emission source; emissions and stack parameters are listed in **Table 8A-11**. The table includes the project's main boiler release characteristics and emission rates at 100 and 40 percent operating loads (60 and 80 percent loads also were modeled, and those input data values are provided in the computer archive and in the detailed emissions calculation sheets). The proposed project's main boiler has separate 3-hour, 24-hour and annual emission limits for $SO_2$ only. These separate averaging period-specific emissions were reflected in the modeling analysis for each respective averaging period.

## Table 8A-10
## Summary of Criteria Pollutant Maximum Potential Emissions

| Pollutant | PC Boiler (tpy) | Two Auxiliary Boilers (tpy) | Emergency Generator (tpy) | Locomotive (tpy) | Firewater Pump Engine (tpy) | Material Handling (tpy) | Project Potential to Emit (PTE) (tpy) |
|---|---|---|---|---|---|---|---|
| CO | 2,649 | 1.74 | 0.42 | 4.53 | 0.08 | n/a | 2,656 |
| $NO_x$ | 1,590 | 4.76 | 0.78 | 18.85 | 0.09 | n/a | 1,614 |
| $SO_2$ | 1,351 | 0.08 | 0.018 | 0.61 | 0.0002 | n/a | 1,352 |
| PM[1] | 265 | 0.84 | 0.02 | 0.59 | 0.005 | 56.8 | 323 |
| $PM_{10}$[2] | 795 | 1.14 | 0.02 | 0.59 | 0.005 | 56.8 | 853 |
| VOC | 80 | 0.12 | (3) | 1.75 | (3) | n/a | 82.5 |
| Lead | 5.3 | neg. | neg. | neg. | neg. | n/a | 5.3 |
| Fluorides | 6.4 | neg. | neg. | neg. | neg. | n/a | 6.4 |
| $H_2SO_4$ | 133 | neg. | neg. | neg. | neg. | n/a | 133 |
| Mercury | neg. | neg. | neg. | neg. | neg. | n/a | neg. |
| Hydrogen Sulfide | neg. | neg. | neg. | neg. | neg. | n/a | neg. |
| Total Reduced Sulfur | neg. | neg. | neg. | neg. | neg. | n/a | neg. |

n/a – not applicable, neg – negligible

[1] PM is defined as filterable particulate matter as measured by USEPA Method 5.
[2] $PM_{10}$ is defined as solid particulate matter smaller than 10 micrometers in diameter as measured by USEPA Method 201 or 201A plus condensable particulate matter as measured by USEPA Method 202. Because $PM_{10}$ includes condensable particulate matter and PM does not include condensable particulate matter, $PM_{10}$ emissions are higher than PM emissions.
[3] Emissions standards for these engines are based upon USEPA Tier standards, which are based on a combination of $NO_X$ + non-methane hydrocarbon; therefore, VOC emissions have been included in $NO_X$ total emissions to produce a conservatively $NO_X$ emission rate.

## Table 8A-11
## Main Boiler Release Characteristics and Emissions

| **Plant Performance** | | | | | | |
|---|---|---|---|---|---|---|
| 100% Load heat input to boiler (MMBtu/hr) | | | | 6,048 | | |
| 40% Load heat input to boiler (MMBtu/hr) | | | | 2,710 | | |
| **Emissions** | **100% Load Emissions** | | | **40% Load Emissions** | | |
| | **lbs/MMBtu** | | **g/s** | **Lbs/MMBtu** | | **g/s** |
| $SO_2$ 3-hour | n/a | | 60.96 | n/a | | 27.32 |
| $SO_2$ 24-hour | 0.06 | | 45.72 | 0.06 | | 20.49 |
| $SO_2$ Annual | n/a | | 38.86 | n/a | | n/a |
| $NO_X$ | 0.06 | | 45.72 | 0.06 | | 20.49 |
| $PM_{10}$ | 0.030 | | 22.86 | 0.030 | | 10.25 |
| CO | 0.10 | | 76.20 | 0.10 | | 34.15 |
| Pb | 0.0002 | | 0.152 | 0.0002 | | 0.0683 |
| **Stack Parameters** | **English** | | | **Metric** | | |
| | **100% Load** | **40% Load** | **Units** | **100% Load** | **40% Load** | **Units** |
| Stack gas exit temperature | 130 | 130 | Fahrenheit | 327.59 | 327.59 | Kelvin |
| Stack gas exit velocity | 65.00 | 31.85 | feet/sec | 19.81 | 9.71 | m/sec |
| Stack height | 730 | 730 | Feet | 222.50 | 222.50 | Meters |
| Stack diameter | 24.40 | 24.40 | Feet | 7.44 | 7.44 | Meters |
| Location | 2450288 East | | UTM Zone 11 NAD-1983 (survey feet) | 746849.22 East | | UTM Zone 11 NAD-1983 (meters) |
| | 13422609 North | | | 4091219.38North | | |
| Base Elevation | 2551.02 | | feet | 777.55 | | Meters |

The TEP also will include various other types of combustion and fugitive emission sources that also are considered in the modeling analysis. Emissions from locomotive and paved road sources have been modeled as a series of volume sources. These sources include the following:

- Auxiliary steam generators (**Table 8A-12**);
- Emergency generators (**Table 8A-13**);
- Fire water pumps (**Table 8A-14**);
- Material handling sources (**Tables 8A-15** and **8A-16**); and
- Emissions from road traffic (**Table 8A-16**).

For the auxiliary boilers, emergency generators, and the fire water pumps, the hourly emission rates listed in **Table 8A-12** through **8A-14** were used to assess modeled impacts for short-term averaging periods (24-hours or less). The modeled impacts for the annual averaging period used the annual tpy emissions (converted to grams per second) listed in listed in **Table 8A-12** through **8A-14**.

For fugitive particulate sources (including the locomotive source), maximum hourly emissions were used as input to AERMOD for assessing the short-term impacts (i.e., up to 24 hours). For those sources that do not operate for the full averaging period being modeled, the source emissions were assigned at their maximum hourly rates to the hours that the source is most likely to operate, and zero for the remainder of the hours. This was accomplished by using the “HROFDAY” emission scaling factor in AERMOD. For those hours that the source was expected to be emitting, a scaling factor of 1 was used. Conversely, for those hours the source was considered to be off, a scaling factor of 0 was used. This approach was used to simulate the most likely combination of emissions and dispersion conditions in the modeling assessment.

For example, emission sources such as coal pile bulldozing, landfill bulldozing, and byproduct fly ash, bottom ash, and gypsum discharge to trucks will typically operate during only a portion of the 24-hour period--during a portion of daytime hours from 6 AM to 9 PM. Since this 15-hour period is longer than the actual operating period of most of the sources, we modeled emissions during a subset of hours within this period that are likely to experience the most restrictive dispersion conditions. Model testing indicated that the most restrictive dispersion in the 6 AM to 9 PM period occurs in the early evening. Therefore, we modeled sources with daytime emissions lasting less than 15 hours to end their period of daily operation at 9 PM.

The hours of operation for each source are specified in **Tables 8A-15** and **8A-16**. Also included in these tables are the hours for which the source emissions were activated in the model, if the hours of operation were less than 24 hours per day.

For those sources that could operate only a few hours per day at random (such as the locomotive, which might arrive at any time of day), sensitivity modeling was conducted to determine when the worst dispersion would occur resulting in the highest ground-level impacts. Specifically for the locomotive and rail car unloading facility (which were conservatively assumed to operate 4 hours per day as opposed to the 3.4 hours actually calculated), the worst-case dispersion was determined to be hours 1600 -1900 in winter through sensitivity modeling. This was determined by looking at the maximum 1-hour and 3-hour impacts for the locomotive source alone. These impacts clearly pointed to the evening/nighttime nocturnal hours as giving the highest ground level concentrations. The locomotive was a much higher contributing source to the overall modeled impacts as compared to the rail car unloader, and was therefore used as the determining source for selecting the worst-case period of dispersion. This sensitivity modeling is included in the modeling archive CD.

Annual modeled impacts used maximum annual emission rates listed in **Tables 8A-15** and **8A-16**.

**Table 8A-12**
**Emission Rates and Stack Parameters for Each Auxiliary Boiler**

| | | |
|---|---|---|
| Estimated Annual Hours of Operation: | 550 | hours/year |
| Stack Height: | 98 | feet |
| Stack Diameter: | 2.92 | Feet |
| Stack Flow Rate: | 33,038 | Cfm |
| Average Stack Exit Temperature: | 284 | $^{o}$F |
| Stack Exit Velocity: | 82 | feet/s |

Model IDS: 0M2, 0M3

| Pollutant | Hourly Emissions | | | Annual Emissions | |
|---|---|---|---|---|---|
| | (lb/hr) | (g/s) | lb/1000 gal | (tpy) | (g/s) |
| CO | 3.15 | 0.40 | 5.0 | 0.87 | 0.024 |
| $NO_x$ | 8.64 | 1.09 | 0.10 lb/MMBtu | 2.38 | 0.068 |
| $PM_{10}$ Total | 2.08 | 0.26 | 3.30 | 0.57 | 0.016 |
| $SO_2$ | 0.14 | 0.018 | 0.22 | 0.04 | .001 |

## Table 8A-13
## Emission Rates and Stack Parameters for the Emergency Diesel Generator

| | | | | | |
|---|---|---|---|---|---|
| Maximum Annual Hours of Operation: | | | 100 | hours/year | |
| Stack Height: | | | 45 | Feet | |
| Stack Diameter: | | | 1 | Feet | |
| Stack Flow Rate: | | | 9058 | Cfm | |
| Stack Gas Exit Temperature: | | | 870 | °F | |
| Stack Gas Exit Velocity: | | | 192.2 | feet/s | |
| Model IDs 0M4 | | | | | |
| | **Hourly Emissions** | | | **Annual Emissions** | |
| **Pollutant** | **(lb/hr)** | **(g/hp-hr)** | **(g/s)** | **(tpy)** | **(g/s)** |
| CO | 8.49 | 2.6 | 1.07 | 0.42 | 0.012 |
| $NO_x$ | 15.68 | 4.8 | 1.98 | 0.78 | 0.022 |
| $PM_{10}$ Total | 0.49 | 0.15 | 0.06 | 0.02 | 0.0007 |
| $SO_2$ | 0.36 | 0.11 | 0.05 | 0.02 | 0.0006 |

## Table 8A-14
## Emission Rates and Stack Parameters for the Diesel Fire Water Pump

| | | | | | |
|---|---|---|---|---|---|
| Maximum Annual Hours of Operation: | | | 100 | hours/year | |
| Stack Height: | | | 30 | Feet | |
| Stack Diameter | | | 0.6 | Feet | |
| Stack Flow Rate: | | | 1265 | Cfm | |
| Stack Gas Exit Temperature: | | | 900 | °F | |
| Stack Gas Exit Velocity: | | | 75 | feet/s | |
| Model IDs: 0M5 | | | | | |
| **Pollutant** | **Hourly Emissions** | | | **Annual Emissions** | |
| | **(lb/hr)** | **(g/hp-hr)** | **(g/s)** | **(tpy)** | **(g/s)** |
| CO | 1.63 | 2.6 | 0.21 | 0.08 | 0.002 |
| $NO_x$ | 1.88 | 3.0 | 0.237 | 0.09 | 0.0023 |
| $PM_{10}$ Total | 0.09 | 0.15 | 0.011 | 0.005 | 0.00013 |
| $SO_2$ | 0.004 | 0.0016 | 0.0005 | 0.0002 | 0.00006 |

## Table 8A-15
## Summary of Model Input for Material Point Handling Sources

| Source Description | Model ID | Emission Type | Stack Coordinates[1] UTM X (m) | Stack Coordinates[1] UTM Y (m) | Stack Height (m) | Stack Base Elevation (m) | Stack Diameter (m) | Stack Velocity (m/s) | Exit Temp (K) | $PM_{10}$ Emissions (g/s)[2] Hourly | $PM_{10}$ Emissions (g/s)[2] Annual | Operating Hours (hr/day) | Modeling Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Crusher Building | 1C5 | Point | 746704.51 | 4091548.85 | 45.72 | 777.55 | 0.64 | 17.78 | 293 | 0.048 | 0.048 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Coal Railcar Unloading[3] | 0C1 | Point | 746920.03 | 4091453.59 | 3.05 | 777.55 | 0.55 | 17.78 | 293 | 0.014 | 0.0009 | 3.4 | Hours of operation are based on time required to unload entire train of coal Source assumed on hours 16-19 |
| Quicklime Silo #1 | 1L1 | Point | 747019.34 | 4091313.61 | 18.90 | 777.55 | 0.34 | 20.30 | 293 | 0.043 | 0.043 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Quicklime Silo #2 | 1L2 | Point | 746766.29 | 4091227.64 | 18.90 | 777.55 | 0.34 | 20.30 | 293 | 0.043 | 0.043 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Flyash Silo Vent and Discharge[4] | 1F1&2 | Point | 746984.10 | 4091266.07 | 67.36 | 777.55 | 0.34 | 17.78 | 293 | 0.076 | 0.076 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Gypsum Silo Vent and Discharge[5] | 1G1&2 | Point | 746941.19 | 4091264.76 | 18.90 | 777.55 | 0.34 | 18.29 | 293 | 0.076 | 0.076 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Activated Carbon Silo | 1LC1 | Point | 746751.06 | 4091227.20 | 18.90 | 777.55 | 0.34 | 20.30 | 293 | 0.043 | 0.043 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Bottom Ash Vent and Discharge[6] | 1B1&2 | Point | 746669.38 | 4091250.20 | 24.99 | 777.55 | 0.34 | 17.78 | 293 | 0.076 | 0.076 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Coal Transfer House | 53 | Point | 746793.00 | 4091451.00 | 32.00 | 777.55 | 0.55 | 17.78 | 293 | 0.048 | 0.048 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |
| Byproduct Silo Filter Vent | 40_BV | Point | 746939.88 | 4091307.67 | 18.90 | 777.55 | 0.36 | 18.29 | 293 | 0.043 | 0.043 | 24 | Source modeled operating 24 hour per day 8,760 hours per year |

[1] UTM Zone 11 NAD83 (meters).
[2] More detailed emission calculations available in the PSD application appendices. $PM_{10}$ emissions represent maximum hourly / annual rates.
[3] Coal railcar unloading annual emission based on 2.944 million tons of coal processed annually as compared to 5,000 tons of coal processed per hour.
[4] Flyash silo vent filter and discharge source is comprised on flyash silo loading and unloading emissions.
[5] Gypsum silo vent filter and discharge source is comprised on gypsum silo loading and unloading emissions.
[6] Bottom ash silo vent filter and discharge source is comprised on bottom ash silo loading and unloading emissions.

## Table 8A-16
## Volume and Area Source Model Input

| Source ID | Source Location[2] X (m) | Y (m) | Base Elev. (m) | Release Height (m) | Oper (hr/dy) | Emission Rate[1] (g/sec) PM$_{10}$ Hrly | PM$_{10}$ An | CO Hrly | SO$_2$ Hrly | SO$_2$ An | NO$_X$ Hrly | NO$_X$ An | Source Parameters[3] Syinit | | Szinit | | Modeling Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volume Sources*** | | | | | | | | | | | | | | | | | |
| 40_TD[4] | 746941.6 | 4091300.5 | 777.55 | 2.50 | 8.0 | 0.012 | 0.003 | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | Anytime between 6 AM – 9 PM Source assumed on hours 14-21 |
| FAS[5] | 746985.4 | 4091267.4 | 777.55 | 2.00 | 3.5 | 0.088 | 0.013 | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | Anytime between 6 AM – 9 PM Source assumed on 17-21 |
| GS[6] | 746941.6 | 4091266.7 | 777.55 | 2.00 | 4.2 | 0.079 | 0.0004 | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | Anytime between 6 AM – 9 PM Source assumed on hours 16-21 |
| BAS[7] | 746668.1 | 4091249.7 | 777.55 | 2.00 | 4.7 | 0.044 | 0.001 | -- | -- | -- | -- | -- | 1.16 | | 2.33 | | Anytime between 6 AM – 9 PM Source assumed on hours 16-21 |
| 1C7A[8] | 746635.0 | 4091313.7 | 777.55 | 82.30 | 24 | 0.063 | 0.063 | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | Sources modeled operating 24 hour per day 8760 hours per year |
| 1C7B | 746649.0 | 4091314.1 | 777.55 | 82.30 | 24 | | | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | |
| 1C7C | 746663.8 | 4091313.7 | 777.55 | 82.30 | 24 | | | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | |
| 1C7D | 746677.9 | 4091313.3 | 777.55 | 82.30 | 24 | | | -- | -- | -- | -- | -- | 2.33 | | 2.33 | | |
| Locomotive[9] | 746365.2 | 4092319.8 | 777.55 | 4.00 | 3.4 | 0.14 | 0.02 | 4.83 | 0.65 | 0.018 | 4.42 | 0.542 | 6.98 | | 3.72 | | Anytime of day<br>For 24-hour averages - source assumed on hours 16-19<br>For 1-, 3-, and 8-hour averages – source assumed to operate all hours |
| Road | 746562.5 | 4090740.0 | 777.55 | 5.00 | 24 | 0.13 | 0.11 | -- | -- | -- | -- | -- | 8.37 | | 4.65 | | Source modeled 24 hour per day 8,760 hours per year |
| ***Rectangular Area*** | | | | | | | | | | | | | **Xinit** | **Yinit** | **Angle** | **Szinit** | |
| 54_WIND[10] | 746632.3 | 4091559.1 | 777.55 | 5.00 | 24 | 0.13 | 0.13 | -- | -- | -- | -- | -- | 230.65 | 570.26 | -1.5 | 0 | Source modeled 24 hour per day 8,760 hours per year |
| 54_BULL[11] | 746632.3 | 4091559.1 | 777.55 | 5.00 | 12 | 0.17 | 0.07 | -- | -- | -- | -- | -- | 230.65 | 570.26 | -1.5 | 0 | Anytime between 6 AM – 9 PM Source assumed on hours 10-21 |
| 54_CONS TACK[12] | 746632.3 | 4091559.1 | 777.55 | 5.00 | 8 | 0.05 | 0.003 | -- | -- | -- | -- | -- | 230.65 | 570.26 | -1.5 | 0 | Anytime of day<br>Source assumed on hours 17-24 |
| CCP_BULL[13] | 747067.9 | 4091275.1 | 777.55 | 5.00 | 12 | 0.17 | 0.06 | -- | -- | -- | -- | -- | 500.0 | 80.94 | -1.50 | 0 | Anytime between 6 AM – 9 PM Source assumed on hours 10-21 |
| CCP_ TRUCK[14] | 747067.9 | 4091275.1 | 777.55 | 5.00 | 13.3 | 0.0001 | 0.0001 | -- | -- | -- | -- | -- | 500.0 | 80.94 | -1.50 | 0 | Anytime between 6 AM – 9 PM Source assumed on hours 8-21 |
| CCP_WIND[15] | 747067.9 | 4091275.1 | 777.55 | 5.00 | 24 | 0.68 | 0.68 | -- | -- | -- | -- | -- | 500.0 | 80.94 | -1.50 | 0 | Source modeled 24 hour per day 8760 hours per year |

1 Emissions rates represent maximum hourly(hrly) / annual rates.
2 Source Locations are provided in UTM Coordinates (Zone 11 – NAD 1983)
3 Xinit = Lateral X dimension of rectangular area source (meters), Yinit = Lateral Y dimension of rectangular area source (meters).
Angle = Orientation angle of the rectangular area source (degrees).
Parameters provided for first source defining road and locomotive segment. Emissions represent total for segment (model files have mode detail).
4 Source ID “40_TD” → byproduct silo discharge to trucks. Daily hours of operation are based on 250, TPH and 2,000 TPD process rate.
5 Source ID “FAS” → flyash silo discharge to trucks. Daily hours of operation are based on 400, TPH and 1,404 TPD process rate.
6 Source ID “GS” → gypsum silo discharge to trucks. Daily hours of operation are based on 360, TPH and 1,500 TPD process rate.
7 Source ID “BAS” → bottom ash silo discharge to trucks. Daily hours of operation are based on 360, TPH and 1,700 TPD process rate.
8 Source ID “1C7A-D” → Coal Transfer House / Tripper Deck source. This was divided into 4 volume sources to represent emissions along the entire roof of the tripper deck. The emission rate represents the total emissions from the tripper deck.
9 Source ID “Locomotive” → Locomotive combustion engine. Daily hours of operation are based time required to unload 1 full train of coal.
10 Source ID “54_WIND” → Coal pile wind erosion.
11 Source ID “54_BULL” → Coal pile bull dozing.
12 Source ID “54_CONSTACK” → Coal pile conveying and stockout.
13 Source ID “CCP_BULL” → CCP landfill bulldozing.
14 Source ID “CCP_TRUCK” → CCP landfill disposal truck drop. Daily hours of operation are based on 79, TPH and 1,047 TPD process rate.
15 Source ID “CCP_WIND” → CCP landfill wind erosion.

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## 8A.5 Modeling Results

### 8A.5.1 PSD Class II Significant Impact Analysis

Emissions associated with the facility's normal operations were modeled to determine whether the ambient air impacts are above PSD SILs. These impacts were assessed using AERMOD at the Class II receptor locations described previously, and compared to the PSD SILs provided in **Table 8A-17**. A full year of representative on-site meteorological data were used as input to AERMOD in the initial application, as discussed in Section 8A.3. The data set actually spans 376 days, therefore the entire period was assessed for short-term impacts. The annual impacts were assessed using a 365-day period from April 20, 2006, through April 19, 2007.

**Table 8A-17**
**PSD Class II Criteria Pollutant SILs**

| Pollutant | Averaging Time (µg/m$^3$) | | | | |
|---|---|---|---|---|---|
| | **Annual** | **24-hour** | **8-hour** | **3-hour** | **1-hour** |
| $SO_2$ | 1 | 5 | - | 25 | - |
| $PM_{10}$ | 1 | 5 | - | - | - |
| $NO_2$ | 1 | - | - | - | - |
| CO | - | - | 500 | - | 2000 |

Source: 40 CFR 51.165(b)(2).

Since the TEP is located in Hydrographic Basin HA 222, the analysis also addressed maximum impacts in that Basin. Since Hydrographic Basins 205, 220, and 221 are nearby (within 20 km), the analysis also specifically examined impacts in these basins (see Section 8A.5.3).

Results of the AERMOD modeling with all of the proposed source emissions modeled, but with the main stack emissions at a range of loads (100, 80, 60, and 40 percent), are presented in **Tables 8A-18** through **8A-21**, respectively. An overall summary of the peak impacts is listed in **Table 8A-22**. For $SO_2$, it is evident that the 100 percent load case is the most controlling. For $PM_{10}$, $NO_X$, and CO, the peak impacts change very little with the main boiler load, so other sources such as auxiliary boilers or the locomotive emissions could be primarily culpable for those peak predicted impacts. Therefore, 100 percent load conditions were used for all subsequent modeling.

## Table 8A-18
## AERMOD Results with Main Boiler at 100 Percent Load

| Averaging Period | Maximum Modeled Concentration ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing (deg) |
|---|---|---|---|---|---|
| **$SO_2$** | | | | | |
| 3-Hour | 50.891 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| 24-Hour | 6.817 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| Period | 0.310 | 742332.31 | 4089707.75 | 4684.96 | 249 |
| **$PM_{10}$** | | | | | |
| 24-Hour | 23.628 | 747761.69 | 4091119.75 | 1066.83 | 102 |
| Period | 4.373 | 747353.25 | 4090749.00 | 873.04 | 134 |
| **$NO_2$** | | | | | |
| Period | 6.305 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **CO** | | | | | |
| 1-Hour | 694.307 | 746366.62 | 4090715.50 | 726.27 | 209 |
| 8-Hour | 216.575 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **Pb** | | | | | |
| Quarterly | 0.012 | 742332.31 | 4089707.75 | 4684.96 | 249 |

## Table 8A-19
## AERMOD Results with Main Boiler at 80 Percent Load

| Averaging Period | Maximum Modeled Concentration ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing (deg) |
|---|---|---|---|---|---|
| **$SO_2$** | | | | | |
| 3-Hour | 50.891 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| 24-Hour | 6.774 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| Period[1] | NA | NA | NA | NA | NA |
| **$PM_{10}$** | | | | | |
| 24-Hour | 23.613 | 747761.69 | 4091119.75 | 1066.83 | 102 |
| Period[1] | NA | NA | NA | NA | NA |
| **$NO_2$** | | | | | |
| Period[1] | NA | NA | NA | NA | NA |
| **CO** | | | | | |
| 1-Hour | 1 Hour | 694.307 | 746366.62 | 4090715.50 | 726.27 |
| 8-Hour | 8 Hour | 216.575 | 746575.88 | 4090722.50 | 643.84 |
| **Pb** | | | | | |
| Quarterly | 0.011 | 742332.31 | 4089707.75 | 4684.96 | 249 |

[1] Annual averaging period modeling only performed for the 100 percent load since the Main Boiler will not operate at 80 percent load for an entire year.

## Table 8A-20
## AERMOD Results with Main Boiler at 60 Percent Load

| Averaging Period | Maximum Modeled Concentration (μg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing (deg) |
|---|---|---|---|---|---|
| **$SO_2$** | | | | | |
| 3-Hour | 50.891 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| 24-Hour | 6.715 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| Period[1] | NA | NA | NA | NA | NA |
| **$PM_{10}$** | | | | | |
| 24-Hour | 23.627 | 747761.69 | 4091119.75 | 1066.83 | 102 |
| Period[1] | NA | NA | NA | NA | NA |
| **$NO_2$** | | | | | |
| Period[1] | NA | NA | NA | NA | NA |
| **CO** | | | | | |
| 1-Hour | 694.307 | 746366.62 | 4090715.50 | 726.27 | 209 |
| 8-Hour | 216.575 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **Pb** | | | | | |
| Quarterly | 0.009 | 742332.31 | 4089457.75 | 4778.33 | 247 |

[1] Annual averaging period modeling only performed for the 100 percent load since the Main Boiler will not operate at 60 percent load for an entire year.

## Table 8A-21
## AERMOD Results with Main Boiler at 40 Percent Load

| Averaging Period | Maximum Modeled Concentration (μg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing (deg) |
|---|---|---|---|---|---|
| **$SO_2$** | | | | | |
| 3-Hour | 50.890 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| 24-Hour | 6.640 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| Period[1] | NA | NA | NA | NA | NA |
| **$PM_{10}$** | | | | | |
| 24-Hour | 23.613 | 747761.69 | 4091119.75 | 1066.83 | 102 |
| Period[1] | NA | NA | NA | NA | NA |
| **$NO_2$** | | | | | |
| Period[1] | NA | NA | NA | NA | NA |
| **CO** | | | | | |
| 1-Hour | 694.307 | 746366.62 | 4090715.50 | 726.27 | 209 |
| 8-Hour | 216.575 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **Pb** | | | | | |
| Quarterly | 0.006 | 742332.31 | 4089457.75 | 4778.33 | 247 |

[1] Annual averaging period modeling only performed for the 100 percent load since the Main Boiler will not operate at 40 percent load for an entire year.

**Table 8A-22**
**Summary of Maximum Results from all Loads**

| Averaging Period | SIL ($\mu g/m^3$) | Maximum Modeled Concentration ($\mu g/m^3$) | Load (%) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing (deg) |
|---|---|---|---|---|---|---|---|
| **$SO_2$** | | | | | | | |
| 3-Hour | 25 | 50.891 | 100 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| 24-Hour | 5 | 6.817 | 100 | 746859.12 | 4092345.25 | 1004.93 | 8 |
| Period | 1 | 0.310 | 100 | 742332.31 | 4089707.75 | 4684.96 | 249 |
| **$PM_{10}$** | | | | | | | |
| 24-Hour | 5 | 23.628 | 100 | 747761.69 | 4091119.75 | 1066.83 | 102 |
| Period | 1 | 4.373 | 100 | 747353.25 | 4090749.00 | 873.04 | 134 |
| **$NO_2$** | | | | | | | |
| Period | 1 | 6.305 | 100 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **CO** | | | | | | | |
| 1-Hour | 2000 | 694.307 | 100 | 746366.62 | 4090715.50 | 726.27 | 209 |
| 8-Hour | 500 | 216.575 | 100 | 746575.88 | 4090722.50 | 643.84 | 193 |
| **Pb** | | | | | | | |
| Quarterly | NA | 0.012 | 100 | 742332.31 | 4089707.75 | 4684.96 | 249 |

The overall summary indicates that the TEP has significant monitoring concentrations for only $PM_{10}$ (see **Table 8A-9**). The results also indicate significant modeled impacts for the following pollutants and averaging times:

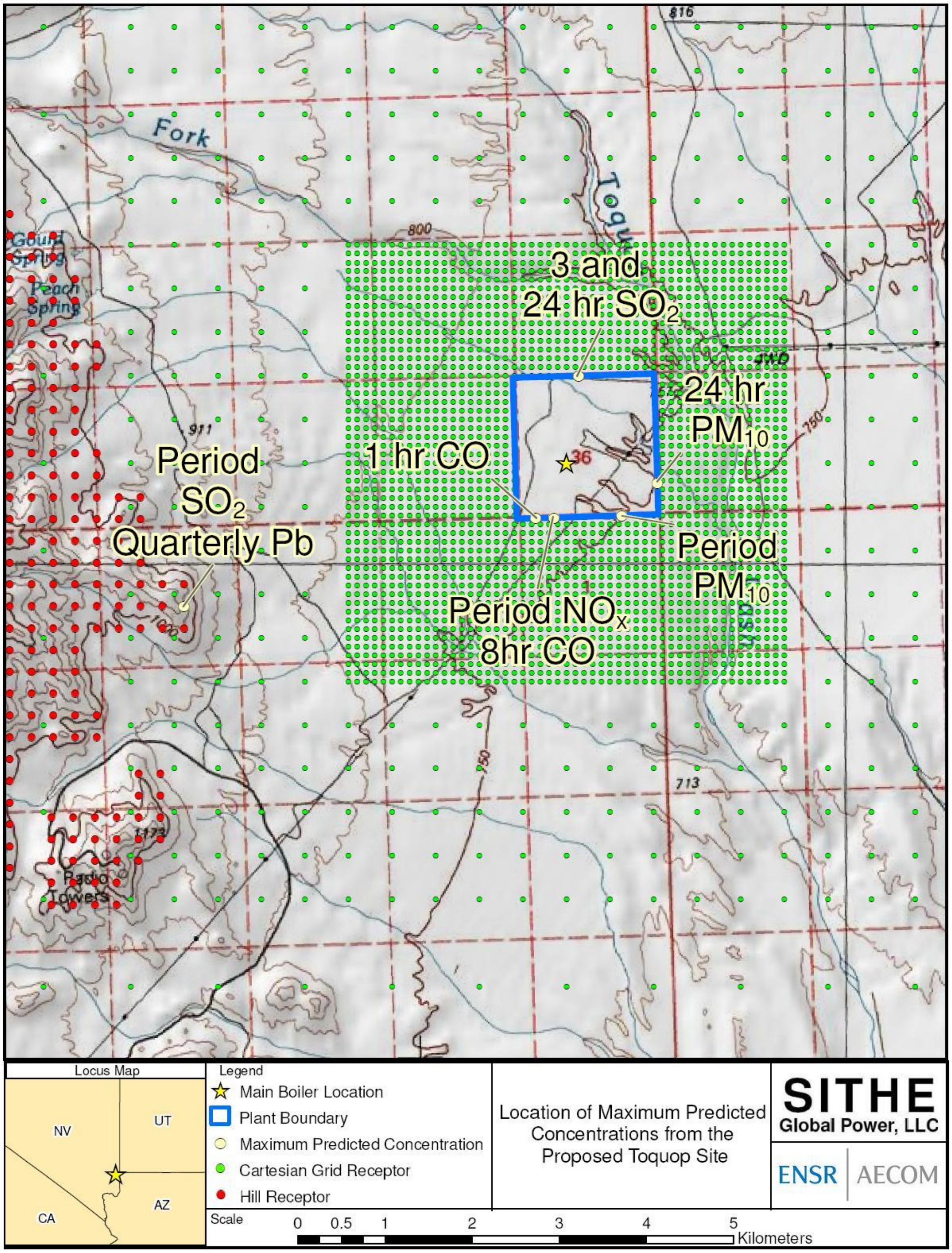
- Short-term (3 and 24-hour) $SO_2$;
- Annual $NO_2$; and
- Short-term (24-hour) and annual $PM_{10}$.

Therefore cumulative modeling was conducted for those pollutants and averaging periods (see Section 8A5.3).

The TEP has insignificant impacts for CO, and the predicted lead concentrations are less than 1 percent of the NAAQS. Therefore, no additional modeling was conducted for CO and lead.

**Figure 8A-14** shows the locations of the peak project impacts. Most of the peak impacts are close to the plant fenceline due to emissions from fugitive sources or low-level sources such as locomotive engines or auxiliary boilers. The 3-hour and annual $SO_2$ impacts are further away, to the southwest of the facility. The peak impacts are influenced by the elevated terrain of the East Mormon Mountains to the southwest and fall within the refined hilltop receptor grids.

**Figure 8A-14. Location of the Maximum Project Impacts**



The extent of the significant impact area (SIA) as determined from the SIL modeling for each pollutant is:

- $SO_2$ → 8 km
- $NO_2$ → 2 km
- $PM_{10}$ → 3.2 km.

### 8A.5.2 Hydrographic Basins

**Figure 8A-13** shows the hydrographic basins in the vicinity of the project site (within 20 km). **Table 8A-22** lists the highest predictions occurring in the Virgin River hydrographic basin, where the project is located. The modeling results for the remaining three hydrographic basins (Lower Meadow Valley Wash, Tule Desert, and Lower Moapa) are provided in **Tables 8A-23** through **8A-25**. As requested by NDEP, cumulative modeling for $SO_2$, $NO_X$, and $PM_{10}$ was conducted for the receptors located in the adjacent hydrographic basins even if the modeled impacts were below the SIL.

**Table 8A-23**
**Peak Impacts in Lower Meadow Valley Wash Basin**

| Pollutant | Averaging Period | Project Maximum Modeled Impact (μg/m$^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Location (UTM Zone 11 NAD 83) Northing (m) | PSD Class II SIL (μg/m$^3$) | Percent of SIL |
|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour | 6.592 | 730720.00 | 4102350.00 | 25 | 26.37 |
| | 24-Hour | 0.967 | 730720.00 | 4102850.00 | 5 | 19.34 |
| | Period | 0.059 | 730720.00 | 4102850.00 | 1 | 5.87 |
| $PM_{10}$ | 24-Hour | 0.500 | 730720.00 | 4102850.00 | 5 | 10.00 |
| | Period | 0.036 | 730720.00 | 4102850.00 | 1 | 3.61 |
| $NO_2$ | Period | 0.070 | 730720.00 | 4102850.00 | 1 | 6.98 |
| CO | 1-Hour | 22.602 | 730720.00 | 4102350.00 | 2000 | 1.13 |
| | 8-Hour | 4.352 | 730720.00 | 4102850.00 | 500 | 0.87 |

## Table 8A-24
## Peak Impacts in Tule Desert Basin

| Pollutant | Averaging Period | Project Maximum Modeled Impact ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | PSD Class II SIL ($\mu g/m^3$) | Percent of SIL |
|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour | 15.760 | 736220.00 | 4099850.00 | 25 | 63.04 |
| | 24-Hour | 1.601 | 736220.00 | 4099850.00 | 5 | 32.02 |
| | Period | 0.130 | 740220.00 | 4097350.00 | 1 | 13.01 |
| $PM_{10}$ | 24-Hour | 0.802 | 736220.00 | 4099850.00 | 5 | 16.04 |
| | Period | 0.081 | 740220.00 | 4097350.00 | 1 | 8.11 |
| $NO_2$ | Period | 0.155 | 740220.00 | 4097350.00 | 1 | 15.50 |
| CO | 1-Hour | 58.958 | 736220.00 | 4099850.00 | 2000 | 2.95 |
| | 8-Hour | 7.949 | 736220.00 | 4099850.00 | 500 | 1.59 |

## Table 8A-25
## Peak Impacts in Lower Moapa Basin

| Pollutant | Averaging Period | Project Maximum Modeled Impact ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | PSD Class II SIL ($\mu g/m^3$) | Percent of SIL |
|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour | 4.740 | 731720.00 | 4082850.00 | 25 | 18.96 |
| | 24-Hour | 0.651 | 732220.00 | 4081850.00 | 5 | 13.03 |
| | Period | 0.070 | 731720.00 | 4083350.00 | 1 | 7.03 |
| $PM_{10}$ | 24-Hour | 0.501 | 732220.00 | 4077850.00 | 5 | 10.02 |
| | Period | 0.045 | 733720.00 | 4076850.00 | 1 | 4.46 |
| $NO_2$ | Period | 0.084 | 731720.00 | 4083350.00 | 1 | 8.36 |
| CO | 1-Hour | 19.534 | 733220.00 | 4077350.00 | 2000 | 0.98 |
| | 8-Hour | 2.580 | 732220.00 | 4078350.00 | 500 | 0.52 |

### 8A.5.3 Assessment of Compliance with NAAQS and PSD Increments

For PSD purposes, when maximum modeled concentrations for a proposed source exceed the SIL for a given pollutant, cumulative modeling is required to assess compliance with AAQS and any applicable PSD increments for that pollutant (see **Table 8A-26**). When modeled concentrations are less than the SILs, the proposed source's contribution to ambient air quality is insignificant, and the impact of the source is considered to have an inconsequential effect upon compliance with ambient standards and increments for that pollutant. Based upon the results presented in Section 8A.5.1, a cumulative modeling analysis is required for $SO_2$, $NO_2$, and $PM_{10}$. A background inventory was requested and obtained from Nevada, Utah, and Arizona out to 80 km from the project site.

## Table 8A-26
## Nevada and Federal Ambient Air Quality Standards

| Pollutant | Averaging Period[1] | Federal Standards Primary μg/m³ | Federal Standards Secondary μg/m³ | Nevada Standards μg/m³ |
|---|---|---|---|---|
| $SO_2$ | Annual | 80 | -- | 80 |
| | 24-Hour | 365 | -- | 365 |
| | 3-Hour | -- | 1,300 | 1,300 |
| $PM_{10}$ | Annual | 50 | 50 | 50 |
| | 24-Hour | 150 | 150 | 150 |
| CO | 8-Hour | 10,000 | -- | 10,500 |
| | 1-Hour | 40,000 | -- | 40,500 |
| $O_3$ | 8-Hour | 157 | 157 | -- |
| | 1-Hour | 235 | 235 | 235 |
| $NO_X$ | Annual | 100 | 100 | 100 |
| Lead | 3-Month | 1.5 | -- | 1.5 |

[1] Short-term federal ambient standards may be exceeded once per year; however, the Nevada standards may never be exceeded. Annual standards may never be exceeded. $O_3$ standard is attained when the expected number of days of an exceedence is equal to or less than one.
-- No ambient standard for this pollutant and/or averaging period.

The modeling of impacts from the proposed facility for the worst-case operating load as determined in the SIL analysis plus the appropriate background sources was conducted for the same receptors that were used in the SIL modeling analysis (including the Basin receptors described in Section 8A3.5.2).

For the NAAQS analysis, highest second-highest short-term predictions along with highest annual predictions were added to a peak monitored background level (obtained from the site-specific monitoring database) to determine compliance with the NAAQS. For the PSD analysis, highest second-highest short-term predictions along with highest annual predictions were used to determine compliance with the PSD increments.

No additional receptors were required because the results of the PSD and NAAQS analyses for each pollutant or averaging period for which the project had a modeled significant impact was already within 100-m spaced receptors or was less than 75 percent of their respective standard.

#### 8A.5.3.1 Background Source Inventory

In preparation for cumulative modeling, a background source inventory was acquired for sources within a radius of 80 km about the source location for each pollutant. An emissions inventory of $SO_2$, $NO_2$, and $PM_{10}$ for all sources in an 80-km radius around TEP was requested from the appropriate state agencies in Nevada, Arizona, and Utah. Clark County, Nevada regulates air emissions independently from the state of Nevada, so an additional inventory request was made to Clark County Department of Air Quality and Environmental Management (DAQEM). The agencies and points of contact for each inventory are listed in **Table 8A-27**. The complete inventories are provided in the PSD permit application and in the computer modeling archive.

**Table 8A-27**
**Agencies Contacted for Emissions Inventory Data**

| State | Agency | Contact |
|---|---|---|
| Arizona | Arizona Department of Environmental Quality | Latha Toopal |
| Nevada | Nevada Division of Environmental Protection | Greg Remer |
| Nevada | Clark County Department of Air Quality and EM | Vasant Rajagopalan |
| Utah | Utah Department of Environmental Quality | Deborah Mcmurtrie/Tom Orth |

Once all the source data were gathered within 80 km of TEP, a screening procedure was then applied to exclude distant or low emitting sources from the NAAQS inventory that would not result in a predicted concentration gradient at the proposed source location; the impacts from these sources are included in the monitored background. Source emission data provided by Arizona and Utah were representative of actual 2004/2005 emissions. To conservatively estimate the PTE emissions from these state's sources, the 2004/2005 average actual emissions were multiplied by 10 prior to the screening analysis. Sources obtained for Nevada were representative of PTE emissions; therefore no conservative scaling factor was needed.

In addition to the conservative estimate of PTE emissions for Utah and Arizona, all sources from Nevada, Utah, and Arizona were conservatively assumed to be PSD increment.

Sources were screened out based on the following criteria:

1. Sources with distances greater than the SIA plus 50 km from TEP were excluded. Based on the results of the Significant Impact analysis, the SIA for $SO_2$, $NO_X$, and $PM_{10}$ are 8, 2, and 3.2 km respectively. This allowed for source search distances to be limited to the SIA plus 50 km or 58, 52, and 53.2 km respectively for $SO_2$, $NO_X$, and $PM_{10}$.

2. Sources were screened background based on a ratio of their annual emissions (for all facility stacks combined) expressed in tons per year (Q) divided by the distance from the project site in kilometers (D) is at least 0.80 for $SO_2$ and $NO_2$ and 0.30 for $PM_{10}$. This screening procedure is consistent with recommendations previously provided to ENSR for PSD Class I increment inventories by Mr. Don Shepherd of the National Park Service (the screening procedure provided in **Appendix 8A-1**).

3. Facilities with emissions greater than 5 tpy that would be excluded from modeling due to the Q/D test were included in the modeling anyway to add a measure of conservatism to the analysis.

The screening procedure on the background source data obtained by ENSR only screened out less than 1 percent of the total mass emissions for sources within the SIA plus 50 km. An electronic spreadsheet that details the screening procedure and contains a list of all sources from the gathered inventory before and after the screening procedure is provided with the electronic modeling files. **Tables 8A-28** through **8A-30** contain a list of sources included in the PSD and NAAQS cumulative modeling analyses. **Figure 8A-15** shows the SIA plus 50 km along with the background sources included in the NAAQS and PSD increment modeling.

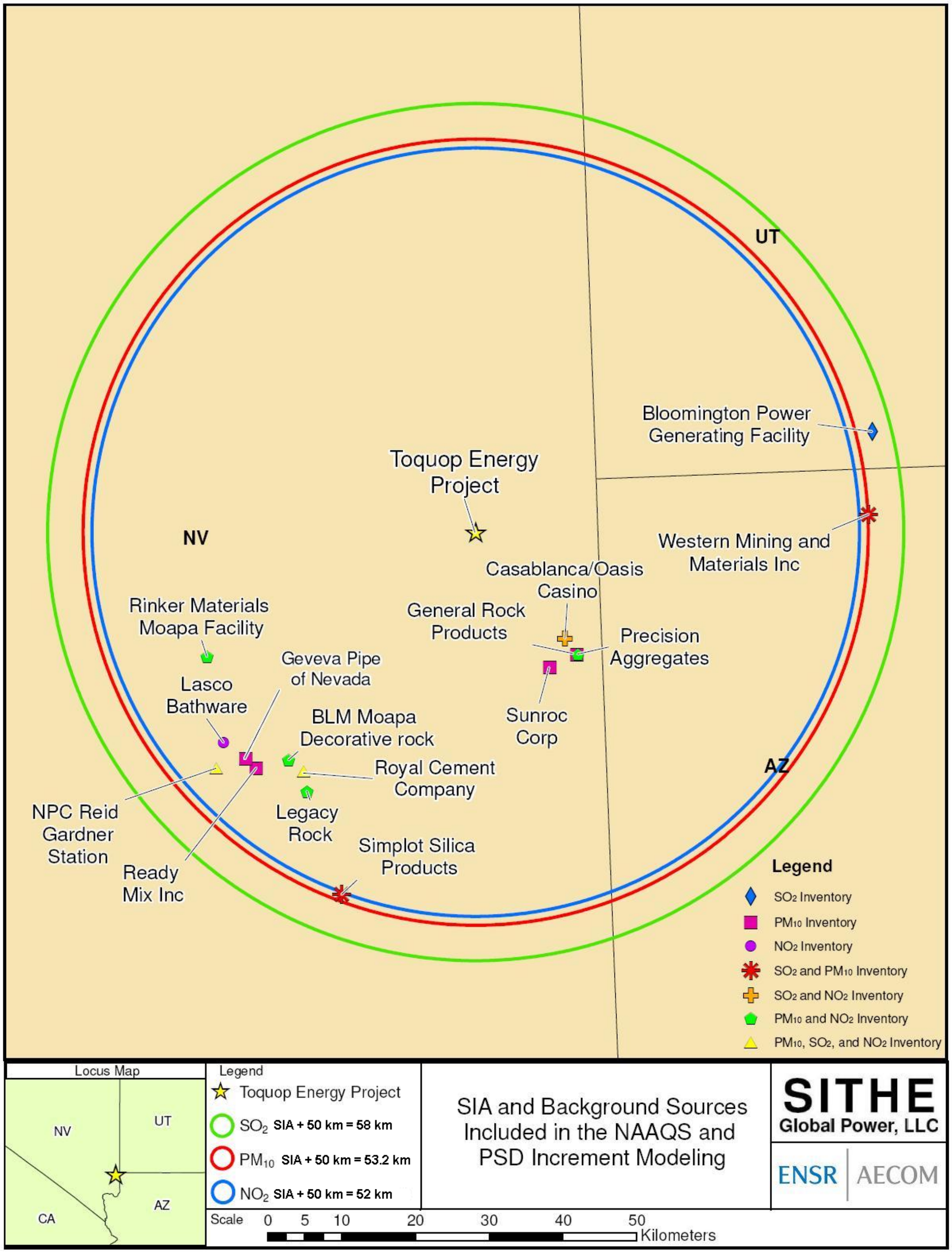
The cumulative source modeling analysis consisted of both short-term and annual PTE emissions. For the Nevada sources, NDEP and Clark County DAQEM provided both short-term and annual PTE emission rates. For the $NO_X$, and $PM_{10}$ annual modeling, the source's annual PTE emissions were used as model input. For the $PM_{10}$ and $SO_2$ short-term modeling, source's hourly PTE were used as model input.

#### 8A.5.3.2 PSD Increment Cumulative Modeling

PSD increment cumulative modeling for $SO_2$, $NO_2$, and $PM_{10}$ was conducted utilizing the project sources with the main boiler at 100 percent load and the inventory of background sources described in Section 8A5.3.1. Modeling was conducted using the same meteorological data and receptors grids used for the SIL analysis. Due to NDEP concerns about the potential impact of this project in and adjacent hydrographic basins, impacts on PSD increment also were assessed for these areas.

Cumulative PSD increment modeling results are presented in **Tables 8A-31** through **8A-34**. Highest second-highest modeled impacts are reported for the short-term averaging periods and the highest modeled impacts are reported averaging periods greater than 24 hours. Modeled impacts for Virgin River hydrographic basin, where the project is located, are listed in **Table 8A-31**.

**Figure 8A-15. SIA and Background Sources Included in the NAAQS and PSD Modeling**



## Table 8A-28
## Background Sources Included in the $SO_2$ Cumulative Modeling Analysis

| | | | Location | | | | | | | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $SO_2$ Emissions (g/s) | | Stack Height | Stack Dia. | Exit Velocity | Stack Temp |
| State | Facility Name | Source | Zone | UTM X | UTM Y | Elev m | Source ID | Hourly | Annual | m | m | m/s | K |
| | | | | | | | ***Point Source*** | | | | | | |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 101 | 0.191 | 0.191 | 1.83 | 0.152 | 9.16 | 634 |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 201 | 0.191 | 0.191 | 1.83 | 0.152 | 9.47 | 638 |
| AZ | Western Mining and Materials | GENERATOR | 12 | 265624 | 4091697 | 947 | 230 | 0.191 | 0.191 | 1.52 | 0.152 | 11.13 | 705 |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 301 | 0.191 | 0.191 | 1.83 | 0.152 | 9.47 | 638 |
| AZ | Western Mining and Materials | GENERATOR | 12 | 265624 | 4091697 | 947 | 330 | 0.191 | 0.191 | 1.22 | 0.152 | 15.27 | 705 |
| NV | Simplot Silica Products | Portable Dryer | 11 | 730405 | 4044325 | 377 | 138_AD | 0.933 | 0.659 | 15.24 | 1.52 | 11.48 | 389 |
| NV | Royal Cement Company | Rotary Kiln | 11 | 723223 | 4059114 | 492 | 154_I01 | 8.059 | 1.84 | 27.43 | 3.05 | 9.06 | 616 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758572 | 758572 | 483 | 622_C05 | 0.032 | 0.0317 | 6.10 | 0.711 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | GTS Thermal fluid heater | 11 | 759252 | 759252 | 485 | 622_A24 | 0.024 | 0.0239 | 5.49 | 0.356 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Raypak boiler | 11 | 759252 | 759252 | 485 | 622_A18 | 0.019 | 0.0190 | 5.49 | 0.559 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Raypak boiler | 11 | 758450 | 758450 | 483 | 622_C | 0.030 | 0.0320 | 6.10 | 0.508 | 2.52 | 383 |
| NV | Casablanca/Oasis Casino | Lochinvar boiler | 11 | 758874 | 758874 | 489 | 622_AA | 0.018 | 0.0184 | 12.19 | 0.305 | 2.52 | 383 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 758550 | 483 | 622_C17 | 0.005 | 0.0055 | 1.22 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758811 | 758811 | 489 | 622_AB | 0.008 | 0.0086 | 1.52 | 0.305 | 2.52 | 455 |
| NV | Casablanca/Oasis Casino | Lattner boiler | 11 | 758665 | 758665 | 483 | 622_C04 | 0.004 | 0.0043 | 3.66 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Lochinvar boiler | 11 | 759208 | 759208 | 490 | 622_AC | 0.011 | 0.0104 | 3.66 | 0.076 | 2.52 | 428 |
| NV | Casablanca/Oasis Casino | Landa pressure washer | 11 | 758663 | 758663 | 483 | 622_C21 | 0.004 | 0.0032 | 3.05 | 0.152 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758911 | 758911 | 490 | 622_A08 | 0.001 | 0.0026 | 3.66 | 0.203 | 2.52 | 455 |
| NV | Casablanca/Oasis Casino | Purex water heater | 11 | 759196 | 759196 | 489 | 622_AD | 0.005 | 0.0052 | 1.22 | 0.102 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Pentair water heater | 11 | 759018 | 759018 | 489 | 622_A12 | 0.001 | 0.0026 | 4.88 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 759187 | 759187 | 488 | 622_AE | 0.006 | 0.0055 | 6.10 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 758550 | 483 | 622_AF | 0.003 | 0.0029 | 0.914 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758766 | 758766 | 489 | 622_AG | 0.003 | 0.0023 | 12.19 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | American heater | 11 | 758917 | 758917 | 486 | 622_AH | 0.006 | 0.006 | 12.19 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758653 | 758653 | 483 | 622_C06 | 0.001 | 0.0012 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758619 | 758619 | 483 | 622_C07 | 0.001 | 0.0012 | 3.66 | 0.203 | 2.52 | 433 |

**Table 8A-28**
**Background Sources Included in the $SO_2$ Cumulative Modeling Analysis**

| | | | Location | | | | | | | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Elev | | $SO_2$ Emissions (g/s) | | Stack Height | Stack Dia. | Exit Velocity | Stack Temp |
| State | Facility Name | Source | Zone | UTM X | UTM Y | m | Source ID | Hourly | Annual | m | m | m/s | K |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758594 | 758594 | 483 | 622_C08 | 0.001 | 0.0012 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758619 | 758619 | 483 | 622_C09 | 0.001 | 0.0012 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758515 | 758515 | 482 | 622_AI | 0.003 | 0.0023 | 4.57 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758588 | 758588 | 483 | 622_AJ | 0.004 | 0.0035 | 6.10 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758572 | 758572 | 483 | 622_AK | 0.003 | 0.0023 | 6.10 | 0.711 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 758550 | 483 | 622_C20 | 0.001 | 0.0012 | 0.914 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | American heater | 11 | 759018 | 759018 | 489 | 622_AL | 0.003 | 0.0012 | 4.57 | 0.152 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Caterpillar generator | 11 | 758887 | 758887 | 489 | 622_B01 | 0.111 | 0.0006 | 4.57 | 0.305 | 50.29 | 789 |
| NV | Casablanca/Oasis Casino | Pentair water heater | 11 | 758951 | 758951 | 490 | 622_A09 | 0.001 | 0.0003 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Onan Generator | 11 | 758804 | 758804 | 489 | 622_B02 | 0.016 | 0.0003 | 4.57 | 0.203 | 66.45 | 755 |
| NV | Casablanca/Oasis Casino | Onan Generator | 11 | 758956 | 758956 | 486 | 622_B03 | 0.008 | 0.0003 | 3.05 | 0.076 | 19.20 | 750 |
| NV | Casablanca/Oasis Casino | Cummins fire pump | 11 | 758956 | 758956 | 486 | 622_B04 | 0.010 | 0.0003 | 5.49 | 0.076 | 98.63 | 708 |
| NV | Casablanca/Oasis Casino | Caterpillar generator | 11 | 758692 | 758692 | 483 | 622_D01 | 0.055 | 0.0003 | 4.57 | 0.203 | 89.00 | 753 |
| NV | Casablanca/Oasis Casino | Caterpillar fire pump | 11 | 758450 | 758450 | 483 | 622_D02 | 0.011 | 0.0003 | 3.05 | 0.152 | 51.21 | 783 |
| NV | NPC Reid Gardner Station | Unit #4 Steam Boiler | 11 | 711632 | 711632 | 482 | RGS_B04 | 108.102 | 108 | 152 | 6.40 | 17.07 | 336 |
| NV | NPC Reid Gardner Station | Unit #3 Steam Boiler | 11 | 711548 | 711548 | 484 | RGS_B03 | 85.806 | 85.8 | 82.30 | 3.93 | 20.42 | 336 |
| NV | NPC Reid Gardner Station | Unit #1 Steam Boiler | 11 | 711546 | 711546 | 485 | RGS_B01 | 84.280 | 84.3 | 60.96 | 4.05 | 17.07 | 336 |
| NV | NPC Reid Gardner Station | Unit #2 Steam Boiler | 11 | 711548 | 711548 | 485 | RGS_B02 | 84.280 | 84.3 | 73.15 | 4.05 | 16.92 | 336 |
| UT | Bloomington Power | diesel engine | 12 | 266771 | 266771 | 753 | BLM | NA | 0.0417 | 0.000 | 0.000 | 0.000 | 0 |
| ***Volume Sources*** | | | | | | | | | | Release Height | Horz. | Vert. | |
| | | | | | | | | | | m | m | m | |
| NV | Simplot Silica Products | Pit Area | 11 | 726706 | 4039754 | 549 | 138_Ap_A | 1.367 | 0.0783 | 4.57 | 279.07 | 4.25 | |
| NV | Simplot Silica Products | Dry Area | 11 | 730222 | 4044204 | 381 | 138_Ap_B | 0.121 | 0.0207 | 7.32 | 135 | 6.8 | |

## Table 8A-29

## Background Sources Included in the $NO_2$ Cumulative Modeling Analysis

| | | | Location | | | | | $NO_X$ Emissions (g/s) | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Elev | | | Stack Height | Stack Dia. | Exit Velocity | Stack Temp |
| State | Facility Name | Source | Zone | UTM X | UTM Y | m | Source ID | Annual | m | m | m/s | K |
| ***Point Sources*** | | | | | | | | | | | | |
| NV | Royal Cement Company | Rotary Kiln | 11 | 723223 | 4059114 | 492 | 154_I01 | 13.8 | 27.43 | 3.05 | 9.06 | 616 |
| NV | Rinker Materials Moapa Facility | 5 Generators | 11 | 710275 | 4074513 | 520 | 585_GEN | 1.35 | 5.49 | 0.305 | 44.50 | 728 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758572 | 4076751 | 483 | 622_C05 | 0.0884 | 6.10 | 0.711 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | GTS Thermal fluid heater | 11 | 759252 | 4076955 | 485 | 622_A24 | 0.0671 | 5.49 | 0.356 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Raypak boiler | 11 | 759252 | 4076955 | 485 | 622_A18 | 0.0530 | 5.49 | 0.559 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Caterpillar generator | 11 | 758887 | 4077101 | 489 | 622_B01 | 0.0389 | 4.57 | 0.305 | 50.29 | 789 |
| NV | Casablanca/Oasis Casino | Raypak boiler | 11 | 758450 | 4076764 | 483 | 622_C | 0.0890 | 6.10 | 0.508 | 2.52 | 383 |
| NV | Casablanca/Oasis Casino | Lochinvar boiler | 11 | 758874 | 4077113 | 489 | 622_A | 0.0507 | 12.19 | 0.305 | 2.52 | 383 |
| NV | Casablanca/Oasis Casino | Caterpillar generator | 11 | 758692 | 4076752 | 483 | 622_D01 | 0.0199 | 4.57 | 0.203 | 89.00 | 753 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 4076701 | 483 | 622_C17 | 0.0150 | 1.22 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Lattner boiler | 11 | 758665 | 4076790 | 483 | 622_C04 | 0.0121 | 3.66 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758811 | 4077109 | 489 | 622_A2 | 0.0236 | 1.52 | 0.305 | 2.52 | 455 |
| NV | Casablanca/Oasis Casino | Lochinvar boiler | 11 | 759208 | 4077334 | 490 | 622_A3 | 0.0285 | 3.66 | 0.076 | 2.52 | 428 |
| NV | Casablanca/Oasis Casino | Landa pressure washer | 11 | 758663 | 4076793 | 483 | 622_C21 | 0.0089 | 3.05 | 0.152 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Onan Generator | 11 | 758804 | 4077105 | 489 | 622_B02 | 0.0083 | 4.57 | 0.203 | 66.45 | 755 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758911 | 4077157 | 490 | 622_A08 | 0.0072 | 3.66 | 0.203 | 2.52 | 455 |
| NV | Casablanca/Oasis Casino | Purex water heater | 11 | 759196 | 4077306 | 489 | 622_A4 | 0.0144 | 1.22 | 0.102 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Pentair water heater | 11 | 759018 | 4077197 | 489 | 622_A12 | 0.0072 | 4.88 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 759187 | 4077218 | 488 | 622_A13 | 0.0072 | 6.10 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Cummins fire pump | 11 | 758956 | 4076959 | 486 | 622_B04 | 0.0069 | 5.49 | 0.076 | 98.63 | 708 |
| NV | Casablanca/Oasis Casino | Caterpillar fire pump | 11 | 758450 | 4076759 | 483 | 622_D02 | 0.0055 | 3.05 | 0.152 | 51.21 | 783 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 759187 | 4077218 | 488 | 622_A5 | 0.0086 | 6.10 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 4076701 | 483 | 622_C5 | 0.0086 | 0.914 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Onan Generator | 11 | 758956 | 4076964 | 486 | 622_B03 | 0.0037 | 3.05 | 0.076 | 19.20 | 750 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758766 | 4077087 | 489 | 622_A6 | 0.0069 | 12.19 | 0.254 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | American heater | 11 | 758917 | 4076867 | 486 | 622_A7 | 0.0173 | 12.19 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758653 | 4076725 | 483 | 622_C06 | 0.0035 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758619 | 4076702 | 483 | 622_C07 | 0.0035 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758594 | 4076716 | 483 | 622_C08 | 0.0035 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758619 | 4076733 | 483 | 622_C09 | 0.0035 | 3.66 | 0.203 | 2.52 | 433 |

## Table 8A-29
## Background Sources Included in the $NO_2$ Cumulative Modeling Analysis

| | | | Location | | | | | $NO_X$ Emissions (g/s) | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Facility Name | Source | Zone | UTM X | UTM Y | Elev m | Source ID | Annual | Stack Height m | Stack Dia. m | Exit Velocity m/s | Stack Temp K |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758515 | 4076718 | 482 | 622_c2 | 0.0069 | 4.57 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758588 | 4076707 | 483 | 622_C3 | 0.0104 | 6.10 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | AO Smith water heater | 11 | 758572 | 4076751 | 483 | 622_C4 | 0.0069 | 6.10 | 0.711 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Teledyne Laars water heater | 11 | 758550 | 4076701 | 483 | 622_C20 | 0.0032 | 0.914 | 0.305 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | Pentair water heater | 11 | 758951 | 4077176 | 490 | 622_A09 | 0.0014 | 3.66 | 0.203 | 2.52 | 433 |
| NV | Casablanca/Oasis Casino | American heater | 11 | 759018 | 4077197 | 489 | 622_A8 | 0.0023 | 4.57 | 0.152 | 2.52 | 433 |
| NV | Precision Aggregates | CAT Diesel Generator | 11 | 760355 | 4074845 | 511 | 15694_D01 | 0.5151 | 4.57 | 0.204 | 85.95 | 755 |
| NV | Precision Aggregates | Olympian Generator | 11 | 760542 | 4074854 | 513 | 15694_D02 | 0.1134 | 3.05 | 0.152 | 51.21 | 755 |
| NV | Precision Aggregates | Olympian Generator | 11 | 760698 | 4074862 | 515 | 15694_D03 | 0.1134 | 3.05 | 0.152 | 51.21 | 755 |
| NV | NPC Reid Gardner Station | Unit #4 Steam Boiler | 11 | 711632 | 4059303 | 482 | RGS_B04 | 186 | 152 | 6.40 | 17.07 | 336 |
| NV | NPC Reid Gardner Station | Unit #3 Steam Boiler | 11 | 711548 | 4059436 | 484 | RGS_B03 | 71.8 | 82.30 | 3.93 | 20.42 | 336 |
| NV | NPC Reid Gardner Station | Unit #1 Steam Boiler | 11 | 711546 | 4059511 | 485 | RGS_B01 | 70.5 | 60.96 | 4.05 | 17.07 | 336 |
| NV | NPC Reid Gardner Station | Unit #2 Steam Boiler | 11 | 711548 | 4059480 | 485 | RGS_B02 | 70.5 | 73.15 | 4.05 | 16.92 | 336 |
| NV | Lasco Bathware | Airex RTO | 11 | 712503 | 4062860 | 521 | 75_A42 | 0.0737 | 11.89 | 0.914 | 22.91 | 380 |
| NV | Lasco Bathware | Air Heater - Line 1 | 11 | 712508 | 4062860 | 521 | 75_A02 | 0.0305 | 6.10 | 0.559 | 20.50 | 305 |
| NV | Lasco Bathware | Air Heater - Line 2 | 11 | 712555 | 4062861 | 521 | 75_A10 | 0.0305 | 6.10 | 0.559 | 20.50 | 305 |
| NV | Lasco Bathware | Air Heater - Line 1 | 11 | 712509 | 4062823 | 521 | 75_A06 | 0.0233 | 6.10 | 0.457 | 20.50 | 305 |
| NV | Lasco Bathware | Air Heater - Line 2 | 11 | 712556 | 4062823 | 521 | 75_A12 | 0.0233 | 6.10 | 0.457 | 20.50 | 305 |
| NV | Legacy Rock | Cummins Engine | 11 | 723827 | 4056265 | 446 | 1591_B02 | 0.0222 | 3.66 | 0.152 | 66.14 | 689 |
| NV | Legacy Rock | Deutz Engine | 11 | 723834 | 4056265 | 445 | 1591_B04 | 0.0222 | 3.66 | 0.076 | 66.14 | 766 |
| NV | Legacy Rock | Deutz Engine | 11 | 723841 | 4056265 | 443 | 1591_B05 | 0.0222 | 3.66 | 0.076 | 66.14 | 766 |
| NV | Legacy Rock | Deutz Engine | 11 | 723847 | 4056265 | 443 | 1591_B06 | 0.0222 | 3.66 | 0.076 | 66.14 | 766 |
| NV | BLM Moapa Decorative rock pit | Duetz Diesel engine | 11 | 721341 | 4060524 | 550 | 15420_B | 0.1443 | 3.05 | 0.152 | 19.20 | 750 |

## Table 8A-30
## Background Sources Included in the $PM_{10}$ Cumulative Modeling Analysis

| State | Facility Name | Source | Location | | | | Source ID | $PM_{10}$ Emissions g/s | | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Zone | UTM X | UTM Y | Elev m | | Hourly | Annual | Stack Height m | Stack Dia. m | Exit Velocity m/s | Stack Temp K |
| ***Point Sources*** | | | | | | | | | | | | | |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 101 | 1.381 | 1.381 | 1.83 | 0.15 | 9.16 | 633.7 |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 201 | 1.381 | 1.381 | 1.83 | 0.15 | 9.47 | 637.6 |
| AZ | Western Mining and Materials | GENERATOR | 12 | 265624 | 4091697 | 947 | 230 | 1.381 | 1.381 | 1.52 | 0.15 | 11.13 | 705.4 |
| AZ | Western Mining and Materials | crusher engine | 12 | 265624 | 4091697 | 947 | 301 | 1.381 | 1.381 | 1.83 | 0.15 | 9.47 | 637.6 |
| AZ | Western Mining and Materials | GENERATOR | 12 | 265624 | 4091697 | 947 | 330 | 1.381 | 1.381 | 1.22 | 0.15 | 15.27 | 705.4 |
| NV | Simplot Silica Products | Coal fired sand dryer | 11 | 730379 | 4044325 | 379 | 138_01 | 1.526 | 1.085 | 15.24 | 388.70 | 11.48 | 1.5 |
| NV | Simplot Silica Products | Portable Dryer | 11 | 730405 | 4044315 | 377 | 138_21 | 1.387 | 0.238 | 15.24 | 388.70 | 11.48 | 1.5 |
| NV | Royal Cement Company | Hammer mill baghouse | 11 | 723190 | 4059132 | 496 | 154_A | 9.905 | 0.552 | 3.05 | 1.89 | 2.25 | 310.9 |
| NV | Royal Cement Company | Kiln Feed baghouse | 11 | 723263 | 4059104 | 491 | 154_C | 0.034 | 0.027 | 22.86 | 0.76 | 9.42 | 366.5 |
| NV | Royal Cement Company | Raw mill baghouse | 11 | 723293 | 4059117 | 488 | 154_D | 0.306 | 0.212 | 15.24 | 1.15 | 9.12 | 366.5 |
| NV | Royal Cement Company | Clinker Cooling baghouse | 11 | 723383 | 4059012 | 482 | 154_F | 0.404 | 0.403 | 10.70 | 1.37 | 12.74 | 477.6 |
| NV | Royal Cement Company | Finish mill baghouse | 11 | 723404 | 4059032 | 482 | 154_G | 0.202 | 0.139 | 15.24 | 0.76 | 14.28 | 366.5 |
| NV | Royal Cement Company | Rotary Kiln | 11 | 723223 | 4059114 | 492 | 154_I01 | 0.934 | 0.935 | 27.43 | 3.05 | 9.06 | 616.5 |
| NV | Sunroc Corp Bunkerville Ready Mix | Generator | 11 | 756732 | 4073128 | 473 | 253_D01 | NA | 0.001 | 3.66 | 0.20 | 67.06 | 751.5 |
| NV | Rinker Materials Moapa Facility | 5 Generators | 11 | 710275 | 4074513 | 520 | 585_GEN | 0.114 | 0.051 | 5.49 | 0.30 | 44.50 | 727.6 |
| NV | Legacy Rock | Deutz Engine | 11 | 723836 | 4056271 | 444 | 1591_B | 0.066 | 0.007 | 3.66 | 0.15 | 66.14 | 688.7 |
| NV | BLM Moapa Decorative rock pit | Caterpillar diesel engine | 11 | 721341 | 4060524 | 550 | 15420_B | 0.107 | 0.011 | 3.05 | 0.15 | 19.20 | 749.8 |
| NV | General Rock Products | John Deere Generator | 11 | 760419 | 4074769 | 509 | 15684_D | 0.078 | 0.006 | 3.05 | 0.06 | 66.14 | 766.5 |
| NV | Precision Aggregates | CAT Diesel Generator | 11 | 760355 | 4074845 | 511 | 15694_D01 | 0.231 | 0.037 | 4.57 | 0.20 | 85.95 | 755.4 |
| NV | Precision Aggregates | Olympian Generator | 11 | 760542 | 4074854 | 513 | 15694_D02 | 0.050 | 0.008 | 3.05 | 0.15 | 51.21 | 755.4 |
| NV | Precision Aggregates | Olympian Generator | 11 | 760698 | 4074862 | 515 | 15694_D03 | 0.050 | 0.008 | 3.05 | 0.15 | 51.21 | 755.4 |
| NV | NPC Reid Gardner Station | Unit #1 Steam Boiler | 11 | 711546 | 4059511 | 485 | RGS_B01 | 30.645 | 30.644 | 60.96 | 4.05 | 17.07 | 335.9 |
| NV | NPC Reid Gardner Station | Unit #2 Steam Boiler | 11 | 711548 | 4059480 | 485 | RGS_B02 | 30.645 | 30.644 | 73.15 | 4.05 | 16.92 | 335.9 |
| NV | NPC Reid Gardner Station | Unit #3 Steam Boiler | 11 | 711548 | 4059436 | 484 | RGS_B03 | 15.600 | 15.600 | 82.30 | 3.93 | 20.42 | 335.9 |
| NV | NPC Reid Gardner Station | Unit #4 Steam Boiler | 11 | 711632 | 4059303 | 482 | RGS_B04 | 11.186 | 11.183 | 152.40 | 6.40 | 17.07 | 335.9 |

## Table 8A-30
## Background Sources Included in the $PM_{10}$ Cumulative Modeling Analysis

| | | | Location | | | | | $PM_{10}$ Emissions g/s | | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Elev | | | | Stack Height | Stack Dia. | Exit Velocity | Stack Temp |
| State | Facility Name | Source | Zone | UTM X | UTM Y | m | Source ID | Hourly | Annual | m | m | m/s | K |
| NV | NPC Reid Gardner Station | Cooling tower Unit 1 - Cell 1-6 | 11 | 711467 | 4059630 | 488 | RGS_CT! | 6.621 | 6.620 | 13.40 | 8.50 | 8.50 | 316.5 |
| NV | NPC Reid Gardner Station | Cooling tower Unit 2 - Cell 1-5 | 11 | 711393 | 4059625 | 488 | RGS_CT2 | 6.369 | 6.366 | 13.40 | 8.50 | 8.50 | 316.5 |
| NV | NPC Reid Gardner Station | Cooling tower Unit 3 - Cell 1-4 | 11 | 711326 | 4059634 | 488 | RGS_CT3 | 6.369 | 6.366 | 13.40 | 8.50 | 8.50 | 316.5 |
| NV | NPC Reid Gardner Station | Cooling tower Unit 4 - Cell 1-8 | 11 | 711577 | 4059141 | 480 | RGS_CT4 | 13.317 | 13.319 | 13.40 | 8.50 | 8.50 | 316.5 |
| NV | NPC Reid Gardner Station | Unit #1-3 Coal Dust Silos | 11 | 711469 | 4059456 | 485 | RGS_C01 | 0.025 | 0.001 | 10.00 | 1.01 | 0.0001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #4 Coal Dust Silos | 11 | 711488 | 4059284 | 482 | RGS_C02 | 0.025 | 0.001 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Crushing and Screening Station | 11 | 711691 | 4059531 | 486 | RGS_C03 | 0.542 | 0.006 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #1-3 Fly Ash Silo | 11 | 711554 | 4059439 | 484 | RGS_C04 | 0.076 | 0.127 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Coal Unloading Station | 11 | 711773 | 4059527 | 487 | RGS_C05 | 4.679 | 1.457 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Coal Conveyor System to Unit 4 | 11 | 711598 | 4059191 | 480 | RGS_C06 | 0.025 | 0.001 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #1-3 Back-up Fly Ash Silo | 11 | 711554 | 4059433 | 484 | RGS_C07 | 0.063 | 0.052 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Fly Ash Disposal Site | 11 | 710616 | 4058108 | 519 | RGS_C08 | 2.585 | 0.910 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #4 Fly Ash Silo | 11 | 711564 | 4059259 | 481 | RGS_C09 | 0.038 | 0.049 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #1-3 Soda ash slurry tank | 11 | 711620 | 4059440 | 483 | RGS_W01 | 0.016 | 0.016 | 9.50 | 10.40 | 0.001 | 293.2 |
| NV | NPC Reid Gardner Station | Unit #4 FGD Soda ash slurry tank | 11 | 711620 | 4059440 | 483 | RGS_W02 | 0.014 | 0.014 | 12.20 | 12.20 | 0.001 | 293.2 |
| NV | NPC Reid Gardner Station | Unit #4 WT Lime Silo | 11 | 711620 | 4059440 | 483 | RGS_W03 | 0.001 | 0.001 | 7.60 | 3.70 | 0.001 | 293.2 |
| NV | NPC Reid Gardner Station | Unit #4 WT Soda ash silo | 11 | 711620 | 4059440 | 483 | RGS_W04 | 0.003 | 0.002 | 6.10 | 3.70 | 0.001 | 293.2 |
| NV | NPC Reid Gardner Station | FGD Back-up quicklime storage | 11 | 711620 | 4059440 | 483 | RGS_W05 | 0.000 | 0.000 | 10.00 | 1.01 | 0.001 | 295.4 |
| NV | NPC Reid Gardner Station | Unit #4 FGD Lime storage silo | 11 | 711620 | 4059440 | 483 | RGS_W06 | 0.003 | 0.001 | 5.80 | 3.70 | 0.001 | 293.2 |
| ***Volume Sources*** | | | | | | | | | | Release Height | Horz. | Vert. | |
| | | | | | | | | | | m | m | m | |
| NV | Simplot Silica Products | Storage Silos | 11 | 730306 | 4044308 | 379 | 138_13 | 0.005 | 0.003 | 4.57 | 4.65 | 4.25 | |
| NV | Simplot Silica Products | Mining Area | 11 | 726706 | 4039754 | 549 | 138_14 | 0.520 | 0.357 | 4.57 | 279.07 | 4.25 | |
| NV | Simplot Silica Products | Production Area | 11 | 730330 | 4044304 | 378 | 138_15 | 0.182 | 0.097 | 6.10 | 85.00 | 5.67 | |
| NV | Simplot Silica Products | Pit Area | 11 | 726706 | 4039754 | 549 | 138_16 | 0.178 | 0.028 | 4.57 | 279.07 | 4.25 | |
| NV | Simplot Silica Products | Dry Area | 11 | 730222 | 4044204 | 381 | 138_17 | 0.446 | 0.066 | 7.32 | 135.00 | 6.80 | |
| NV | Simplot Silica Products | Florence | 11 | 726572 | 4039945 | 540 | 138_18 | 1.502 | 0.002 | 4.57 | 28.35 | 4.25 | |

## Table 8A-30
## Background Sources Included in the $PM_{10}$ Cumulative Modeling Analysis

| | | | Location | | | | | $PM_{10}$ Emissions g/s | | Point Sources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Facility Name | Source | Zone | UTM X | UTM Y | Elev m | Source ID | Hourly | Annual | Stack Height m | Stack Dia. m | Exit Velocity m/s | Stack Temp K |
| NV | Simplot Silica Products | Conveyor Extension | 11 | 726662 | 4039840 | 541 | 138_19 | 0.001 | 0.002 | 4.57 | 85.06 | 4.25 | |
| NV | Simplot Silica Products | Pit Blasting | 11 | 726833 | 4039722 | 505 | 138_20 | 1.502 | 0.002 | 4.57 | 28.35 | 4.25 | |
| NV | Royal Cement Company | Fugitives | 11 | 723323 | 4059083 | 487 | 154_rest | 4.345 | 0.752 | 5.00 | 58.14 | 4.70 | |
| NV | Sunroc Corp Bunkerville Ready Mix | Crushing/Screening/Batching | 11 | 756756 | 4073070 | 474 | 253_ABC | NA | 0.125 | 5.00 | 75.00 | 4.70 | |
| NV | Rinker Materials Moapa Facility | Aggregate Processing | 11 | 710275 | 4074513 | 520 | 585_AGG | 1.388 | 0.559 | 5.00 | 100.00 | 4.65 | |
| NV | Ready Mix Inc | | 11 | 716985 | 4059448 | 480 | 736ALL | 3.994 | 0.721 | 10.00 | 185.00 | 9.30 | |
| NV | Geneva Pipe of Nevada | | 11 | 715524 | 4060744 | 471 | GPN | NA | 0.146 | 5.00 | 10.00 | 10.00 | |
| NV | Legacy Rock | Aggregate processing | 11 | 723836 | 4056271 | 444 | 1591_A1to7 | 1.135 | 0.110 | 5.00 | 50.00 | 4.70 | |
| NV | BLM Moapa Decorative rock pit | Mining Processing | 11 | 721341 | 4060524 | 550 | 15420A1to11 | 1.825 | 0.195 | 5.00 | 50.00 | 4.70 | |
| NV | General Rock Products | Aggregate processing | 11 | 760419 | 4074769 | 509 | 15684_ABC | 0.511 | 0.161 | 6.00 | 50.00 | 5.60 | |
| NV | Precision Aggregates | Aggregate processing | 11 | 760352 | 4074848 | 511 | 15694_ABC1 | 1.629 | 0.142 | 6.00 | 100.00 | 5.60 | |
| NV | Precision Aggregates | Aggregate processing | 11 | 760697 | 4074863 | 515 | 15694_ABC2 | 1.629 | 0.142 | 6.00 | 100.00 | 5.60 | |
| ***Area Sources*** | | | | | | | | | | Release Height | East | North | Angle from |
| NV | Simplot Silica Products | ROAD1 | 11 | 730359 | 4044331 | 378 | 138_02 | 0.125 | 0.023 | m | m | m | North |
| NV | Simplot Silica Products | ROAD2 | 11 | 730190 | 4044031 | 387 | 138_03 | 0.218 | 0.041 | 2.00 | 9.00 | 344.42 | 210.0 |
| NV | Simplot Silica Products | ROAD3 | 11 | 730252 | 4043438 | 382 | 138_04 | 0.317 | 0.059 | 2.00 | 9.00 | 596.07 | 174.0 |
| NV | Simplot Silica Products | ROAD4 | 11 | 729392 | 4043312 | 392 | 138_05 | 0.284 | 0.053 | 2.00 | 9.00 | 869.58 | 261.0 |
| NV | Simplot Silica Products | ROAD5 | 11 | 728727 | 4042927 | 403 | 138_06 | 0.148 | 0.027 | 2.00 | 9.00 | 768.33 | 240.0 |
| NV | Simplot Silica Products | ROAD6 | 11 | 728456 | 4042640 | 409 | 138_07 | 0.436 | 0.081 | 2.00 | 9.00 | 394.72 | 222.0 |
| NV | Simplot Silica Products | ROAD7 | 11 | 728042 | 4041527 | 419 | 138_08 | 0.382 | 0.071 | 2.00 | 9.00 | 1190.32 | 200.0 |
| NV | Simplot Silica Products | ROAD8 | 11 | 727178 | 4040950 | 451 | 138_09 | 0.141 | 0.027 | 2.00 | 9.00 | 1037.07 | 236.0 |
| NV | Simplot Silica Products | ROAD9 | 11 | 726800 | 4040844 | 453 | 138_10 | 0.344 | 0.064 | 2.00 | 9.00 | 392.80 | 252.0 |
| NV | Simplot Silica Products | ROAD10 | 11 | 727213 | 4040008 | 475 | 138_11 | 0.049 | 0.009 | 2.00 | 9.00 | 931.65 | 153.0 |
| NV | Simplot Silica Products | ROAD11 | 11 | 727203 | 4039876 | 479 | 138_12 | 0.164 | 0.030 | 2.00 | 9.00 | 133.55 | 181.0 |

## Table 8A-31
## PSD Increment Cumulative Modeling Analysis – Main Receptor Grid

| Pollutant | Averaging Period | Modeled Impact ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing | PSD Class II Increment ($\mu g/m^3$) | Percent of Increment (%) |
|---|---|---|---|---|---|---|---|---|
| SO2 | 3-Hour[1] | 48.44 | 726720.00 | 4071350.00 | 28284.27 | 225 | 512 | 9.46 |
| | 24-Hour[1] | 7.01 | 726720.00 | 4073350.00 | 26907.25 | 228 | 91 | 7.71 |
| $PM_{10}$ | 24-Hour[1,3] | 36.80 (28.99) | 760720.00 | 4075350.00 | 21260.29 | 139 | 30 | 122.68 |
| | 24-Hour[1,4] | 19.77 | 747765.94 | 4090971.25 | 1112.40 | 110 | 30 | 65.91 |
| | Annual[2] | 4.51 | 747353.25 | 4090749.00 | 873.04 | 134 | 17 | 26.54 |
| $NO_2$ | Annual[2] | 6.74 | 746575.88 | 4090722.50 | 643.84 | 193 | 25 | 26.97 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.
[3] Result reflects the total impact from all background sources and TEP project sources. The value in parentheses is the result obtained by Clark County for impacts assessed from the Precision Aggregates facility alone.
[4] Result reflects the highest-second-highest concentrations from all background sources and TEP project sources where TEP has a significant impact.

## Table 8A-32
## PSD Increment Cumulative Modeling Analysis – Lower Meadow Valley Wash Basin

| Pollutant | Averaging Period | Modeled Impact ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing | PSD Class II Increment ($\mu g/m^3$) | Percent of Increment (%) |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 8.56 | 727720.00 | 4086350.00 | 19646.88 | 255 | 512 | 1.67 |
| | 24-Hour[1] | 2.08 | 727220.00 | 4087850.00 | 19811.61 | 260 | 91 | 2.28 |
| $PM_{10}$ | 24-Hour[1] | 1.15 | 727220.00 | 4087850.00 | 19811.61 | 260 | 30 | 3.82 |
| | Annual[2] | 0.19 | 727720.00 | 4086350.00 | 19646.88 | 255 | 17 | 1.09 |
| $NO_2$ | Annual[2] | 0.56 | 727720.00 | 4086350.00 | 19646.88 | 255 | 25 | 2.24 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

## Table 8A-33
## PSD Increment Cumulative Modeling Analysis – Tule Desert Basin

| Pollutant | Averaging Period | Modeled Impact ($\mu g/m^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing | PSD Class II Increment ($\mu g/m^3$) | Percent of Increment (%) |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 10.90 | 740220.00 | 4097350.00 | 8845.90 | 313 | 512 | 2.13 |
| | 24-Hour[1] | 2.66 | 734720.00 | 4106350.00 | 19209.37 | 321 | 91 | 2.93 |
| $PM_{10}$ | 24-Hour[1] | 1.01 | 738720.00 | 4098350.00 | 10630.15 | 311 | 30 | 3.36 |
| | Annual[2] | 0.24 | 739720.00 | 4099850.00 | 11011.36 | 321 | 17 | 1.41 |
| $NO_2$ | Annual[2] | 0.70 | 739720.00 | 4099850.00 | 11011.36 | 321 | 25 | 2.80 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

**Table 8A-34**
**PSD Increment Cumulative Modeling Analysis – Lower Moapa Basin**

| Pollutant | Averaging Period | Modeled Impact (μg/m$^3$) | Location (UTM Zone 11 NAD 83) Easting (m) | Northing (m) | Distance (m) | Bearing | PSD Class II Increment (μg/m$^3$) | Percent of Increment (%) |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 26.90 | 733720.00 | 4076350.00 | 19849.43 | 221 | 512 | 5.25 |
| | 24-Hour[1] | 3.95 | 731220.00 | 4078850.00 | 19912.31 | 231 | 91 | 4.34 |
| $PM_{10}$ | 24-Hour[1] | 1.77 | 733720.00 | 4076350.00 | 19849.43 | 221 | 30 | 5.91 |
| | Annual[2] | 0.29 | 731220.00 | 4078850.00 | 19912.31 | 231 | 17 | 1.71 |
| $NO_2$ | Annual[2] | 0.90 | 731220.00 | 4078850.00 | 19912.31 | 231 | 25 | 3.61 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

The results presented in **Tables 8A-31** through **8A-34** show that the emissions from the proposed project plus those from other PSD increment-consuming sources will not exceed any PSD increment (or even two-thirds of the full increment) with the exception of $PM_{10}$ 24-hour. The $PM_{10}$ 24-hour modeled impact of 36.803 μg/m$^3$ shows an exceedance of the available PSD increment. However further investigation of this impact reveals that this is the only receptor that is predicted to exceed the PSD increment. The highest modeled impact at this receptor from the TEP project sources is 0.26 μg/m$^3$, well below the $PM_{10}$ 24-hour significance level of 5 μg/m$^3$. Therefore, the majority of this impact is due to the background sources.

Further investigation of this predicted PSD increment exceedance showed that a majority of this contribution is from Precision Aggregates, a minor source located at the edge of the receptor grid near Mesquite, Clark County, Nevada. Clark County DAQEM confirmed that this source was first permitted in January 2006, after the $PM_{10}$ minor source baseline date for the Virgin Valley air shed was triggered (on December 19, 2001; see http://www.westar.org/Committees/TDocs/AQCR%20maps/PM10_02Dec04.pdf). As part of the minor source permit, a site-specific $PM_{10}$ PSD increment modeling demonstration was conducted by the Clark County DAQEM for Precision Aggregates that shows the source is in compliance with the 24-hour $PM_{10}$ PSD increment (see **Appendix 8A-4**), even with total source $PM_{10}$ emissions that are consistent with those modeled for the TEP cumulative analysis. The reasons for the differing modeling results between the Toquop analysis and the Clark County analysis are as follows:

- The Clark County analysis used a 5-year meteorological database specifically selected for the Precision Aggregates source, rather than another site-specific database geared towards predicting impacts at the TEP proposed project site.

- The Clark County modeling also accounted for more detailed emission source placement, in addition to a specific exclusion of ambient air within the source's fence line.

**Appendix 8A-4** includes the minor source permit for Precision Aggregates as received from Clark County DAQEM, which documents the compliance with the $PM_{10}$ PSD increments.

Aside from the receptor discussed above, the second highest $PM_{10}$ 24-hour impact for which the TEP project has a significant contribution is 19.77 μg/m$^3$. Therefore, the proposed TEP project is in compliance with the applicable PSD increments, and no additional modeling is required.

#### 8A.5.3.3 NAAQS Cumulative Modeling

NAAQS cumulative modeling for $SO_2$, $NO_2$, and $PM_{10}$ was conducted utilizing the project sources with the main boiler at 100 percent load and the inventory of background sources described in Section 8A5.3.1. Modeling was conducted using the same meteorological data and receptors grids used for the SIL analysis. Due to NDEP concerns about the potential impact of this project in and adjacent hydrographic basins, impacts on NAAQS compliance also were assessed for these areas.

NAAQS cumulative modeling results for the proposed project are presented in **Tables 8A-35** through **8A-38**. Highest second-highest modeled impacts are reported for the short-term averaging periods and the highest modeled impacts are reported averaging periods greater than 24 hours. The summary tables provide the maximum modeled impacts in addition to the total impact, which includes the ambient background concentration to account for distant and/or small sources that were not explicitly modeled. Modeled impacts for Virgin River hydrographic basin, where the project is located, are shown in **Table 8A-35**.

The results presented in **Tables 8A-35** through **8A-38** show that the emissions from the proposed project, plus those from other nearby sources plus regional background will not exceed any NAAQS by a wide margin (or even half of the NAAQS), and are therefore in compliance with the applicable ambient air quality standards, thus no additional modeling is required.

## Table 8A-35
## NAAQS Cumulative Modeling Analysis – Main Receptor Grid

| Pollutant | Averaging Period | Modeled Impact (µg/m³) | Ambient Background (µg/m³) | Total Impact (µg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Location (UTM Zone 11 NAD 83) Northing (m) | Distance (m) | Bearing | NAAQS (µg/m³) | Percent NAAQS |
|---|---|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 48.44 | 28.0 | 76.44 | 726720.00 | 4071350.00 | 28284.27 | 225 | 1300 | 5.88 |
| | 24-Hour[1] | 7.01 | 19.1 | 26.11 | 726720.00 | 4073350.00 | 26907.25 | 228 | 365 | 7.15 |
| $PM_{10}$ | 24-Hour[1] | 36.80 | 41.0 | 77.80 | 760720.00 | 4075350.00 | 21260.29 | 139 | 150 | 51.87 |
| | Annual[2] | 4.51 | 8.8 | 13.31 | 747353.25 | 4090749.00 | 873.04 | 134 | 50 | 26.62 |
| $NO_2$ | Annual[2] | 6.74 | 7.0 | 13.74 | 746575.88 | 4090722.50 | 643.84 | 193 | 100 | 13.74 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

## Table 8A-36
## NAAQS Cumulative Modeling Analysis – Lower Meadow Valley Wash Basin

| Pollutant | Averaging Period | Modeled Impact (µg/m³) | Ambient Background (µg/m³) | Total Impact (µg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Location (UTM Zone 11 NAD 83) Northing (m) | Distance (m) | Bearing | NAAQS (µg/m³) | Percent NAAQS |
|---|---|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 8.56 | 28.0 | 36.56 | 727720.00 | 4086350.00 | 19646.88 | 255 | 1300 | 2.81 |
| | 24-Hour[1] | 2.08 | 19.1 | 21.18 | 727220.00 | 4087850.00 | 19811.61 | 260 | 365 | 5.80 |
| $PM_{10}$ | 24-Hour[1] | 1.15 | 41.0 | 42.15 | 727220.00 | 4087850.00 | 19811.61 | 260 | 150 | 28.10 |
| | Annual[2] | 0.19 | 8.8 | 8.99 | 727720.00 | 4086350.00 | 19646.88 | 255 | 50 | 17.97 |
| $NO_2$ | Annual[2] | 0.56 | 7.0 | 7.56 | 727720.00 | 4086350.00 | 19646.88 | 255 | 100 | 7.56 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

## Table 8A-37
## NAAQS Cumulative Modeling Analysis – Tule Desert Basin

| Pollutant | Averaging Period | Modeled Impact (µg/m³) | Ambient Background (µg/m³) | Total Impact (µg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Location (UTM Zone 11 NAD 83) Northing (m) | Distance (m) | Bearing | NAAQS (µg/m³) | Percent NAAQS |
|---|---|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 10.90 | 28.0 | 38.90 | 740220.00 | 4097350.00 | 8845.90 | 313 | 1300 | 2.99 |
| | 24-Hour[1] | 2.66 | 19.1 | 21.76 | 734720.00 | 4106350.00 | 19209.37 | 321 | 365 | 5.96 |
| $PM_{10}$ | 24-Hour[1] | 1.01 | 41.0 | 42.01 | 738720.00 | 4098350.00 | 10630.15 | 311 | 150 | 28.01 |
| | Annual[2] | 0.24 | 8.8 | 9.04 | 739720.00 | 4099850.00 | 11011.36 | 321 | 50 | 18.08 |
| $NO_2$ | Annual[2] | 0.70 | 7.0 | 7.70 | 739720.00 | 4099850.00 | 11011.36 | 321 | 100 | 7.70 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

**Table 8A-38**
**NAAQS Cumulative Modeling Analysis – Lower Moapa Basin**

| Pollutant | Averaging Period | Modeled Impact (μg/m³) | Ambient Background (μg/m³) | Total Impact (μg/m³) | Location (UTM Zone 11 NAD 83) Easting (m) | Location (UTM Zone 11 NAD 83) Northing (m) | Distance (m) | Bearing | NAAQS (μg/m³) | Percent NAAQS |
|---|---|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 3-Hour[1] | 26.90 | 28.0 | 54.90 | 733720.00 | 4076350.00 | 19849.43 | 221 | 1300 | 4.22 |
| | 24-Hour[1] | 3.95 | 19.1 | 23.05 | 731220.00 | 4078850.00 | 19912.31 | 231 | 365 | 6.31 |
| $PM_{10}$ | 24-Hour[1] | 1.77 | 41.0 | 42.77 | 733720.00 | 4076350.00 | 19849.43 | 221 | 150 | 28.52 |
| | Annual[2] | 0.29 | 8.8 | 9.09 | 731220.00 | 4078850.00 | 19912.31 | 231 | 50 | 18.18 |
| $NO_2$ | Annual[2] | 0.90 | 7.0 | 7.90 | 731220.00 | 4078850.00 | 19912.31 | 231 | 100 | 7.90 |

[1] Modeled impact reflects the highest second-highest concentration.
[2] Modeled impact reflects the highest concentration.

## 8A.5.4 Other Air Quality Impacts

### 8A.5.4.1 Start-up Emissions

During start-up, the boilers will fire diesel fuel rather than coal, and the plant emissions averaged over the startup period will be lower than both the 40 and 100 percent load operational emissions, which have been separately analyzed. Therefore, no further analysis of start-up emissions was conducted.

### 8A.5.4.2 Associated Growth Analysis

A growth analysis examines the potential emissions from secondary sources associated with the proposed project. While these activities are not directly involved in project operation, the emissions can reasonably be expected to occur; for instance, industrial, commercial, and residential growth that will occur in the general area due to the TEP. Secondary emissions do not include any emissions which come directly from a mobile source, such as emissions from the tailpipe of any on-road motor vehicle or the propulsion of a train (USEPA 1990). They also do not include sources that do not impact the same general area as the source under review. Due to the fact that the project site is not adjacent to a labor force that would serve the plant or any facilities that would support a town, the emissions due to any residential growth will not impact the project area and will not be included in the growth analysis. The construction period will feature a transient work force that does not contribute substantially to long-term growth. The workforce for both construction and operation of the plant will be within commuting distance of the plant, but the air quality impacts will be distant from the TEP and spread out over a large area.

For the proposed facility, secondary emissions will be associated with construction activities. As mentioned above, the only non-temporary emissions (greater than 24 months in duration) associated with construction activities are for a concrete batch plant, which will not be present during normal plant operations. Since the emissions from normal plant operations will exceed those from the concrete batch plant, no further analysis of secondary impacts from associated growth is needed for this project.

#### 8A.5.4.3 Soils and Vegetation Impacts

PSD regulations require an analysis of air quality impacts on sensitive vegetation types, with significant commercial or recreational value, and sensitive types of soil. The TEP is located in an area consisting primarily of desert shrubland and open range. Affected vegetation consists primarily of sagebrush, mixed shrub, and grasses (Bureau of Land Management 2003). Soils in the vicinity of the plant are composed of alluvial sediments, which are relatively deep and well drained. The predicted impacts attributable to the proposed project are listed against the screening levels presented in *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals* (USEPA 1980); see **Table 8A-39**. The results show that the TEP impacts are less than 15 percent of each screening concentration value. Therefore, the project will not have an adverse impact on local soils and vegetation.

**Table 8A-39**
**Screening Concentrations for Soils and Vegetation**

| Pollutant | Averaging Period | Screening Concentration ($\mu g/m^3$) | Predicted Concentration ($\mu g/m^3$) |
|---|---|---|---|
| $SO_2$ | 1-Hour | 917 | 94.66 |
| | 3-Hour | 786 | 50.89 |
| | Annual | 18 | 0.31 |
| $NO_2$ | 4-Hour[1] | 3,760 | 485.35 |
| | 1-Month[2] | 564 | 52.51 |
| | Annual | 94 | 6.30 |
| CO | Weekly[3] | 1,800,000 | 216.57 |

Source: “A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals”. EPA 450/2-81-078, December 1980

[1] 3-hour averaging time conservatively used for prediction.
[2] 24-hour averaging time conservatively used for prediction.
[3] 8-hour averaging period conservatively used for prediction.

Most of the designated vegetation screening levels are equivalent to or less stringent than the AAQS and/or PSD increments; therefore, compliance with the AAQS and PSD increments assures compliance with sensitive vegetation screening levels.

#### 8A.5.4.4 Ozone Analysis

Since projected volatile organic compound emissions for this project are above 25 tons/year, ambient ozone was modeled using the Scheffe model for screening purposes. The screening level analysis was conducted to evaluate the upper-limit incremental effect of emissions from the proposed facility on ambient ozone concentrations. The analysis followed the *"VOC/NOx Point Source Screening Tables by Richard D. Scheffe"* from the USEPA's Office of Air Quality Planning and Standards (available at http://ndep.nv.gov/bapc/download/model/scheffe.pdf). Although these tables were published in draft form in 1988, they have neither been finalized nor formally included in USEPA guidance. The tables are based on sensitivity analysis of the Reactive Plume Model, Version II (RPM-II) a point source model which included a simplified photochemical mechanism (CB4). Two look-up tables have been developed, Table 1 for rural areas (applicable here) and Table 2 for urban areas. The input parameters used in the look-up table include non-methane organic compound (NMOC, synonymous with VOC) emissions and oxides of nitrogen emissions ($NO_X$). Results are provided for three categories of sources, with:

1. NMOC emissions greater than 20.7 times $NO_X$ emissions;
2. NMOC emissions greater between 5.2 and 20.7 times $NO_X$ emissions; and
3. NMOC emissions less than 5.2 times $NO_X$ emissions.

The maximum potential incremental 1-hour $O_3$ concentration anywhere downwind is then estimated by selecting the emissions ratio that applies from these three categories and then interpolating from the table according to NMOC emissions.

For this application, Table 1 in the Scheffe report, applicable to rural areas, was applied. The total maximum emissions of NMOC expressed on an annualized basis are 87 tons/year and the maximum $NO_X$ emissions are 1607 tons/year. According to the Scheffe Table 1, the maximum incremental 1-hour ozone concentration would be 0.013 parts per million (ppm).

To put this screening-level estimate in context, the on-site monitoring data (presently available from April 2006 through May 2007) indicate a maximum 1-hour $O_3$ concentration of 0.0788 ppm and a maximum 8-hour concentration of 0.0712 ppm. If it is conservatively assumed that the incremental screening level impact occurs on the same hour as the peak monitored concentration, the net maximum 1-hour concentration would be 0.092 ppm (0.0788 ppm + 0.013 ppm). This is well below than the previous 1-hour ambient standard of 0.125 ppm. To evaluate the potential contribution to the maximum 8-hour concentration, the 1-hour value interpolated from the table can be multiplied by 0.90, which is the ratio of the peak ambient 8-hour and 1-hour monitored concentrations. This results in an estimated maximum 8-hour incremental concentration of 0.012 ppm due to the project emissions. Conservatively adding this value to the measured ambient concentration of 0.0712 ppm (assuming concurrent impacts) results in a maximum 8-hour concentration of 0.0832 ppm, which is less than the 8-hour standard of 0.085 ppm.

It should be noted that the Scheffe method is not necessarily appropriate for sources such as the present case where the ratio NMOC to $NO_X$ is two orders of magnitude less than the category listed in the tables. Nevertheless, application of this highly conservative approach demonstrates compliance with the ambient ozone standard.

#### 8A.5.4.5 Visible Plume Analysis

This analysis is addressed in Appendix 8B for visibility impacts within 50 km at the Lake Mead National Recreational Area.

## 8A.6 References


Bureau of Land Management. 2003. Proposed Toquop Land Disposal Amendment to the Caliente Management Framework Plan and Final Environmental Impact Statement for the Toquop Energy Project, 2003. United States Department of the Interior Bureau of Land Management.

Nevada Division of Environmental Protection, 2003. Ambient Air Quality Monitoring Guidelines. June 2003.

U.S. Environmental Protection Agency (USEPA). 2005a. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). EPA-454/B-03-002 (November 2004). Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, 22771. Internet website: http://www.epa.gov/scram001/metobsdata_procaccprogs.htm#aermet. Accessed December 2005.

______. 2005b. AERMOD Implementation Guide. September 27, 2005. Available at http://www.epa.gov/scram001/dispersion_prefrec.htm#aermod, accessed December 2005.

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______. 1985. *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Document for the Stack Height Regulations)*. EPA-450/4-80-023R. June 1985.

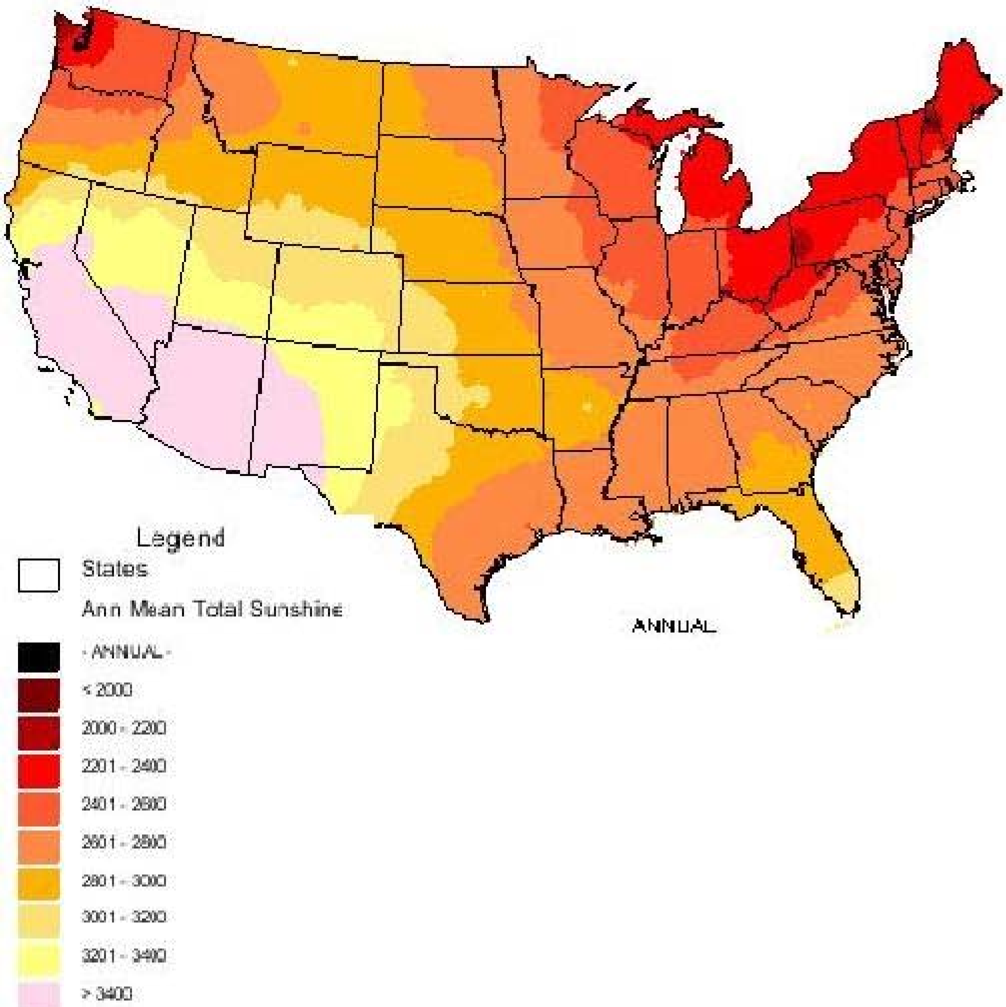
______. 1980. *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals.* EPA-450/2-81-078. Research Triangle Park, North Carolina, 27711.

**ATTACHMENT 8A-1**
**OF THE CLASS II MODELING REPORT**

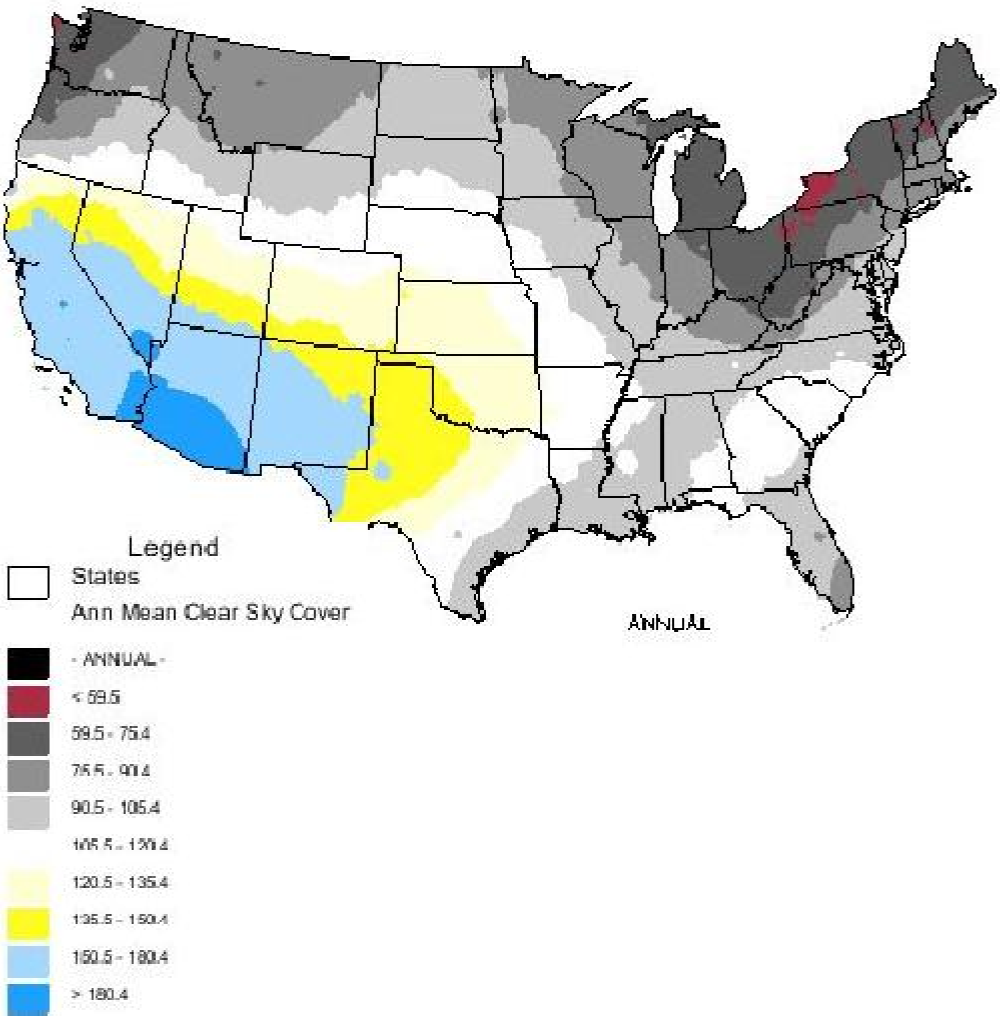
## JUSTIFICATION FOR SELECTING ST.GEORGE, AZ FOR TOQUOP SITE CLOUD COVER DATA

Figures obtained from US Climate Atlas (http://gis.ncdc.noaa.gov/website/ims-climatls/index.html)

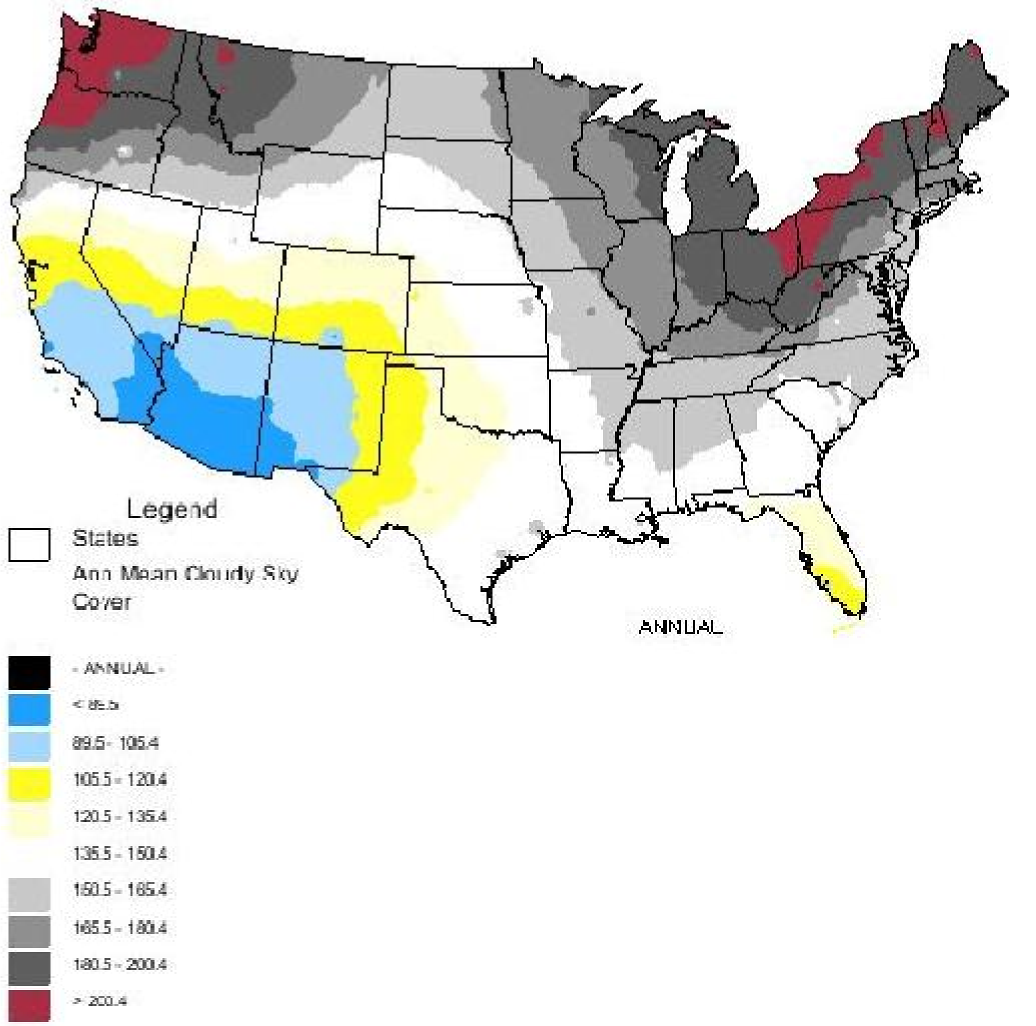
**Annual Mean Total Sunshine Hours**



## Annual Mean Clear Sky Cover



## Annual Mean Cloudy Sky Cover



## MONITORING DATA RECOVERY BY QUARTER

| channel | Data Recovery for the Quarter[1] April 2006 - June 2006, April 2007 | | |
|---|---|---|---|
| | possible hours | valid hours | percent recovery |
| 10WS | 2184 | 2184 | 100.0% |
| 10WD | 2184 | 2184 | 100.0% |
| 10ST | 2184 | 2184 | 100.0% |
| 50WS | 2184 | 2184 | 100.0% |
| 50WD | 2184 | 2184 | 100.0% |
| 50ST | 2184 | 2184 | 100.0% |
| 10 VWS | 2184 | 2184 | 100.0% |
| 50 VWS | 2184 | 2184 | 100.0% |
| 10SW | 2184 | 2184 | 100.0% |
| 50SW | 2184 | 2184 | 100.0% |
| 2mt | 2184 | 2184 | 100.0% |
| 10mt | 2184 | 2184 | 100.0% |
| 50mt | 2184 | 2184 | 100.0% |
| 10-2dt | 2184 | 2184 | 100.0% |
| 50-2dt | 2184 | 2184 | 100.0% |
| 10-2dt/8m | 2184 | 2184 | 100.0% |
| 50-2dt/53m | 2184 | 2184 | 100.0% |
| RH% | 2184 | 2184 | 100.0% |
| Sol $W/m^2$ | 2184 | 2184 | 100.0% |
| Precip. | 2184 | 2184 | 100.0% |
| Pressure | 2184 | 2184 | 100.0% |
| $SO_2$ | 2904 | 2742 | 94.4% |
| NO | 2904 | 2745 | 94.5% |
| NOx | 2904 | 2745 | 94.5% |
| $NO_2$ | 2904 | 2745 | 94.5% |
| $O_3$ | 2904 | 2770 | 95.4% |
| Stn T | 2184 | 2184 | 100.0% |
| $PM_{10}$ | 20 (days) | 20 (days) | 100.0% |
| TSP | 20 (days) | 20 (days) | 100.0% |
| SODAR | 2184 | 2046 | 93.7% |

[1] For ambient air quality data, the statistics cover four months (April-June 2006 and April 2007). For meteorological data, the statistics represent the equivalent of 3 months (91 days) within this 4-month period that omit the power outage-affected days of April 1-19, 2006, and May 9-19, 2006.

| | Data Recovery for the Quarter | | |
|---|---|---|---|
| | July 2006 - September 2006 | | |
| channel | possible hours | valid hours | percent recovery |
| | Qtr | Qtr | Qtr |
| 10WS | 2208 | 2208 | 100.0% |
| 10WD | 2208 | 2208 | 100.0% |
| 10ST | 2208 | 2208 | 100.0% |
| 50WS | 2208 | 2208 | 100.0% |
| 50WD | 2208 | 2208 | 100.0% |
| 50ST | 2208 | 2208 | 100.0% |
| 10 VWS | 2208 | 2208 | 100.0% |
| 50 VWS | 2208 | 2208 | 100.0% |
| 10SW | 2208 | 2208 | 100.0% |
| 50SW | 2208 | 2208 | 100.0% |
| 2mt | 2208 | 2208 | 100.0% |
| 10mt | 2208 | 2208 | 100.0% |
| 50mt | 2208 | 2208 | 100.0% |
| 10-2dt | 2208 | 2208 | 100.0% |
| 50-2dt | 2208 | 2208 | 100.0% |
| 10-2dt/8 | 2208 | 2208 | 100.0% |
| 50-2dt/53 | 2208 | 2208 | 100.0% |
| RH% | 2208 | 2208 | 100.0% |
| Sol w/m$^2$ | 2208 | 2208 | 100.0% |
| Precip. | 2208 | 2206 | 99.9% |
| Pressure | 2208 | 2208 | 100.0% |
| $SO_2$ | 2208 | 1969 | 89.2% |
| NO | 2208 | 1999 | 90.5% |
| $NO_x$ | 2208 | 1999 | 90.5% |
| $NO_2$ | 2208 | 1999 | 90.5% |
| $O_3$ | 2208 | 2021 | 91.5% |
| $PM_{10}$ | 15 | 14 | 93.3% |
| TSP | 15 | 14 | 93.3% |
| SODAR | 2208 | 2046 | 92.7% |

Note: $PM_{10}$ and TSP data represent days of monitoring, not hours

| | | | | |
|---|---|---|---|---|
| | Data Recovery for the Quarter | | | |
| | October 2006 - December 2006 | | | |
| channel | possible | valid | percent | |
| | hours | hours | recovery | |
| | Qtr | Qtr | Qtr | |
| 10WS | 2208 | 2208 | 100.0% | |
| 10WD | 2208 | 2208 | 100.0% | |
| 10ST | 2208 | 2208 | 100.0% | |
| 50WS | 2208 | 2208 | 100.0% | |
| 50WD | 2208 | 2208 | 100.0% | |
| 50ST | 2208 | 2208 | 100.0% | |
| 10 VWS | 2208 | 2208 | 100.0% | |
| 50 VWS | 2208 | 2208 | 100.0% | |
| 10SW | 2208 | 2208 | 100.0% | |
| 50SW | 2208 | 2208 | 100.0% | |
| 2mt | 2208 | 2208 | 100.0% | |
| 10mt | 2208 | 2208 | 100.0% | |
| 50mt | 2208 | 2208 | 100.0% | |
| 10-2dt | 2208 | 2208 | 100.0% | |
| 50-2dt | 2208 | 2208 | 100.0% | |
| 10-2dt/8 | 2208 | 2208 | 100.0% | |
| 50-2dt/53 | 2208 | 2208 | 100.0% | |
| RH% | 2208 | 2208 | 100.0% | |
| Sol w/m$^2$ | 2208 | 2208 | 100.0% | |
| Precip. | 2208 | 2208 | 100.0% | |
| Pressure | 2208 | 2208 | 100.0% | |
| $SO_2$ | 2208 | 2073 | 93.9% | |
| NO | 2208 | 2073 | 93.9% | |
| $NO_x$ | 2208 | 2073 | 93.9% | |
| $NO_2$ | 2208 | 2073 | 93.9% | |
| $O_3$ | 2208 | 2082 | 94.3% | |
| $PM_{10}$ | 15 | 15 | 100.0% | |
| TSP | 15 | 15 | 100.0% | |
| SODAR* | 2208 | 2205 | 99.9% | |
| | | | | |
| *SODAR data recovery represents combined data | | | | |

Note: $PM_{10}$ and TSP data represent days of monitoring, not hours

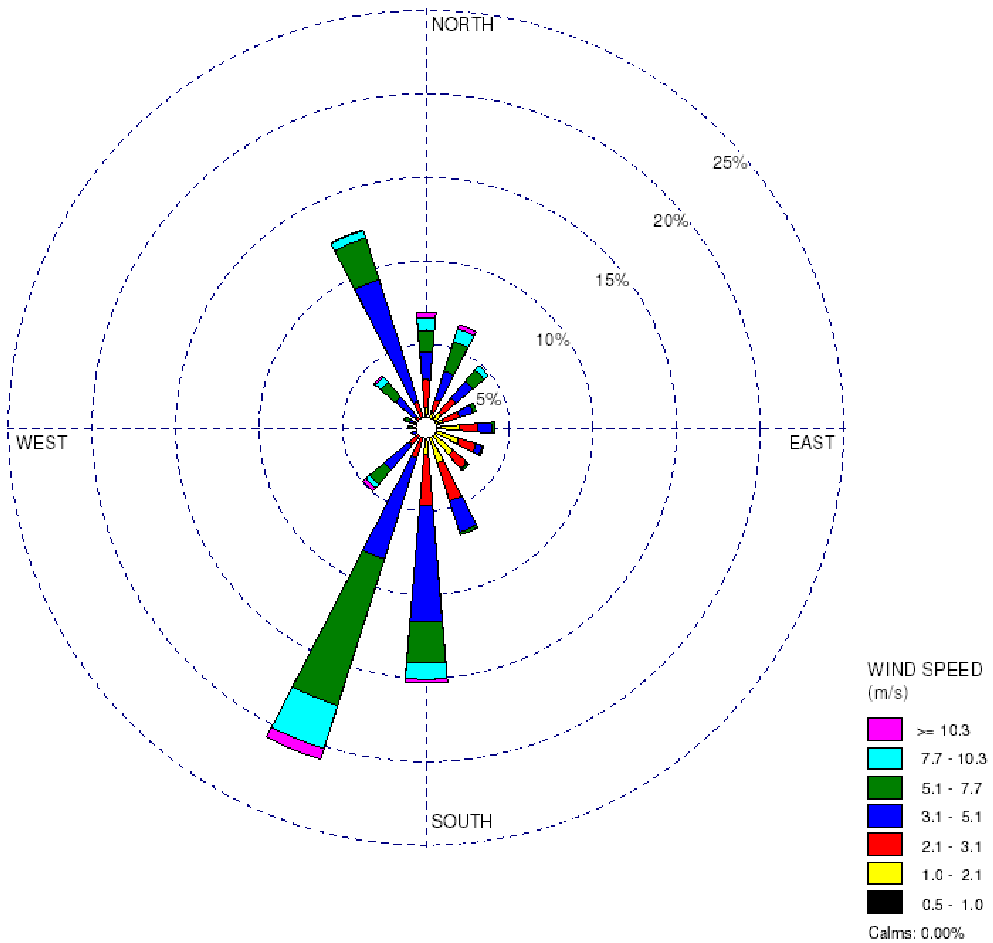
| | Data Recovery for the Quarter | | | |
|---|---|---|---|---|
| | January 2007 - March 2007 | | | |
| channel | possible | valid | percent | |
| | hours | hours | recovery | |
| | Qtr | Qtr | Qtr | |
| 10WS | 2160 | 2149 | 99.5% | |
| 10WD | 2160 | 2149 | 99.5% | |
| 10ST | 2160 | 2149 | 99.5% | |
| 50WS | 2160 | 2149 | 99.5% | |
| 50WD | 2160 | 2149 | 99.5% | |
| 50ST | 2160 | 2149 | 99.5% | |
| 10 VWS | 2160 | 2149 | 99.5% | |
| 50 VWS | 2160 | 2149 | 99.5% | |
| 10SW | 2160 | 2149 | 99.5% | |
| 50SW | 2160 | 2149 | 99.5% | |
| 2mt | 2160 | 2149 | 99.5% | |
| 10mt | 2160 | 2149 | 99.5% | |
| 50mt | 2160 | 2149 | 99.5% | |
| 10-2dt | 2160 | 2149 | 99.5% | |
| 50-2dt | 2160 | 2149 | 99.5% | |
| 10-2dt/8 | 2160 | 2149 | 99.5% | |
| 50-2dt/53 | 2160 | 2149 | 99.5% | |
| RH% | 2160 | 2160 | 100.0% | |
| Sol w/m$^2$ | 2160 | 2139 | 99.0% | |
| Precip. | 2160 | 2157 | 99.9% | |
| Pressure | 2160 | 2160 | 100.0% | |
| $SO_2$ | 2160 | 1990 | 92.1% | |
| NO | 2160 | 1990 | 92.1% | |
| $NO_x$ | 2160 | 1990 | 92.1% | |
| $NO_2$ | 2160 | 1990 | 92.1% | |
| $O_3$ | 2160 | 1988 | 92.0% | |
| $PM_{10}$ | 15 | 15 | 100.0% | |
| TSP | 15 | 15 | 100.0% | |
| SODAR* | 2160 | 2154 | 99.7% | |
| | | | | |
| *SODAR data recovery represents combined data | | | | |

Note: $PM_{10}$ and TSP data represent days of monitoring, not hours

## WIND ROSES FOR THE 10-M LEVEL

WIND ROSE PLOT:
Wind Rose Based for Toquop Tower - Daytime Plot
4/20/2006 - 4/30/2007 - 10 meter Level

DISPLAY:
Wind Speed
Direction (blowing from)



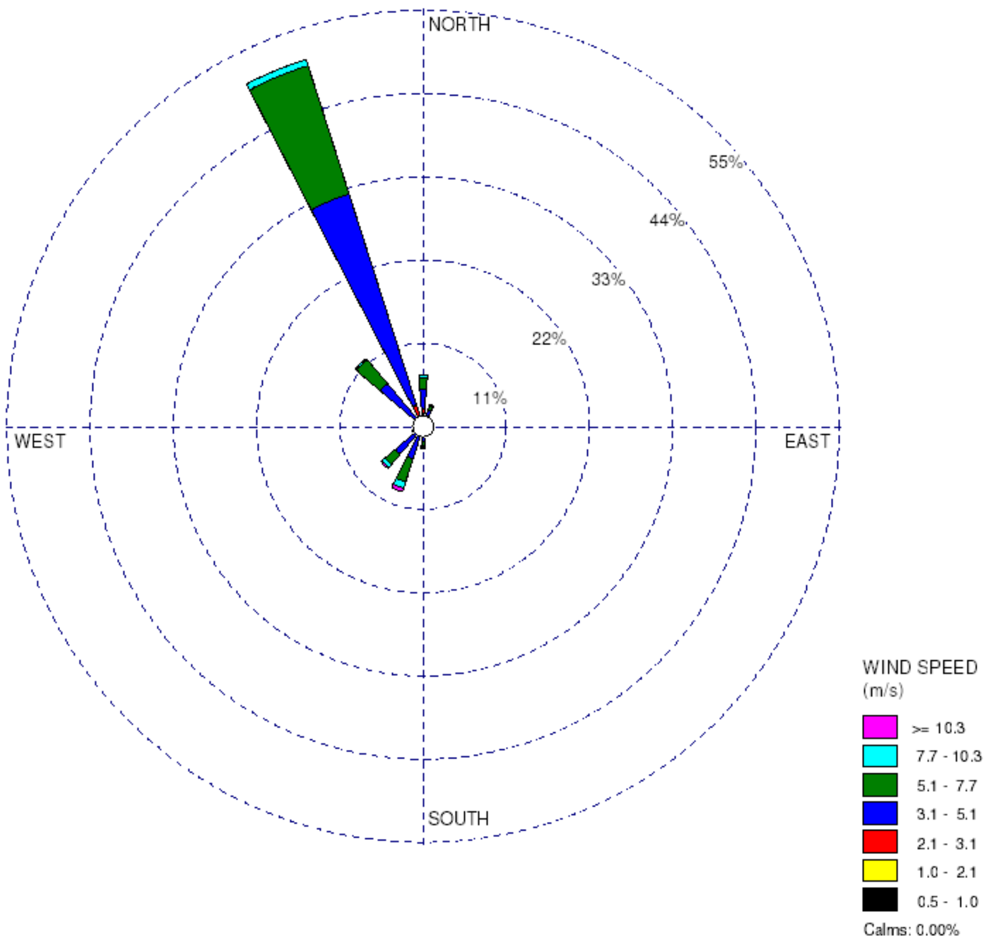

| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 10 meter level for daytime hours only. | DATA PERIOD:<br>2006-2007<br>Jan 1 - Dec 31<br>07:00 - 18:00 | COMPANY NAME:<br>Toquop Energy, LLC - Toquop Energy | |
| | | MODELER:<br>M. Stresing | ENSR \| AECOM |
| | CALM WINDS:<br>0.00% | TOTAL COUNT:<br>4440 hrs. | |
| | AVG. WIND SPEED:<br>4.34 m/s | DATE:<br>6/26/2007 | PROJECT NO.:<br>10784-004-200 |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Nighttime Plot**
**4/20/2006 - 4/30/2007 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**

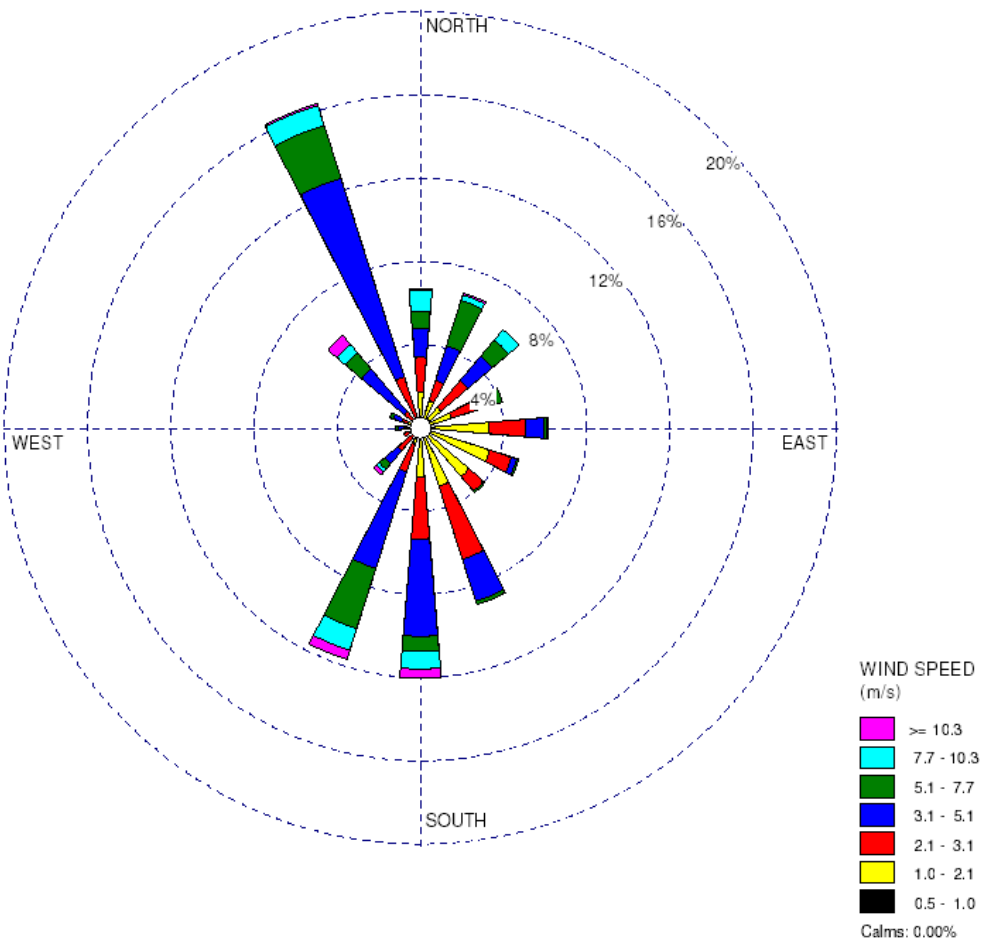



| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 10 meter level for all nighttime hours. | | COMPANY NAME:<br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br>**M. Stresing** | ENSR \| AECOM |
| | CALM WINDS:<br>**0.00%** | TOTAL COUNT:<br>**4452 hrs.** | |
| | AVG. WIND SPEED:<br>**4.64 m/s** | DATE:<br>**6/26/2007** | PROJECT NO.:<br>**10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Fall Daytime Plot**
**9/1/2006 - 11/30/2006 - 10 meter Level**

DISPLAY:
**Wind Speed**
**Direction (blowing from)**




COMMENTS:

Plot represents the 10 meter level for daytime hours during the fall.

COMPANY NAME:

**Toquop Energy, LLC - Toquop Energy**

MODELER:

**M. Stresing**

ENSR | AECOM

CALM WINDS:

**0.00%**

TOTAL COUNT:

**1091 hrs.**

AVG. WIND SPEED:

**3.83 m/s**

DATE:

**6/26/2007**

PROJECT NO.:

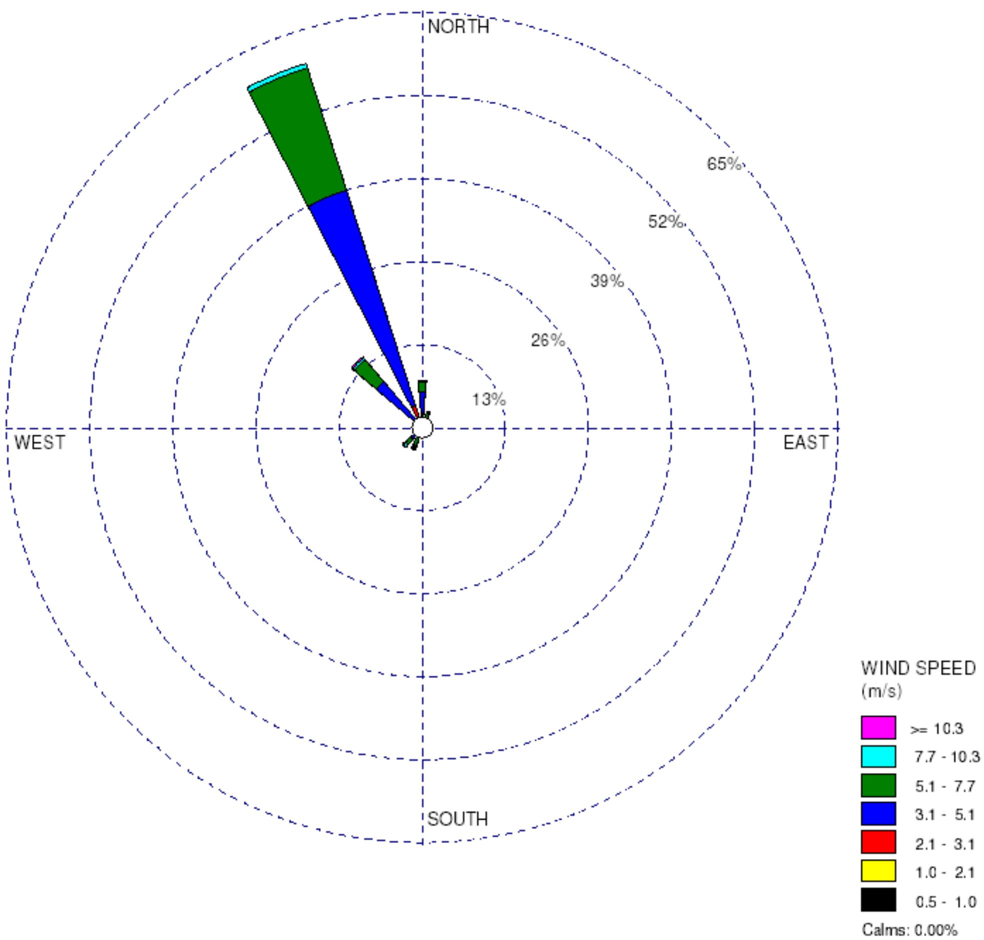
**10784-004-200**

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Fall Nighttime Plot**
**09/1/2006 - 11/30/2006 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**



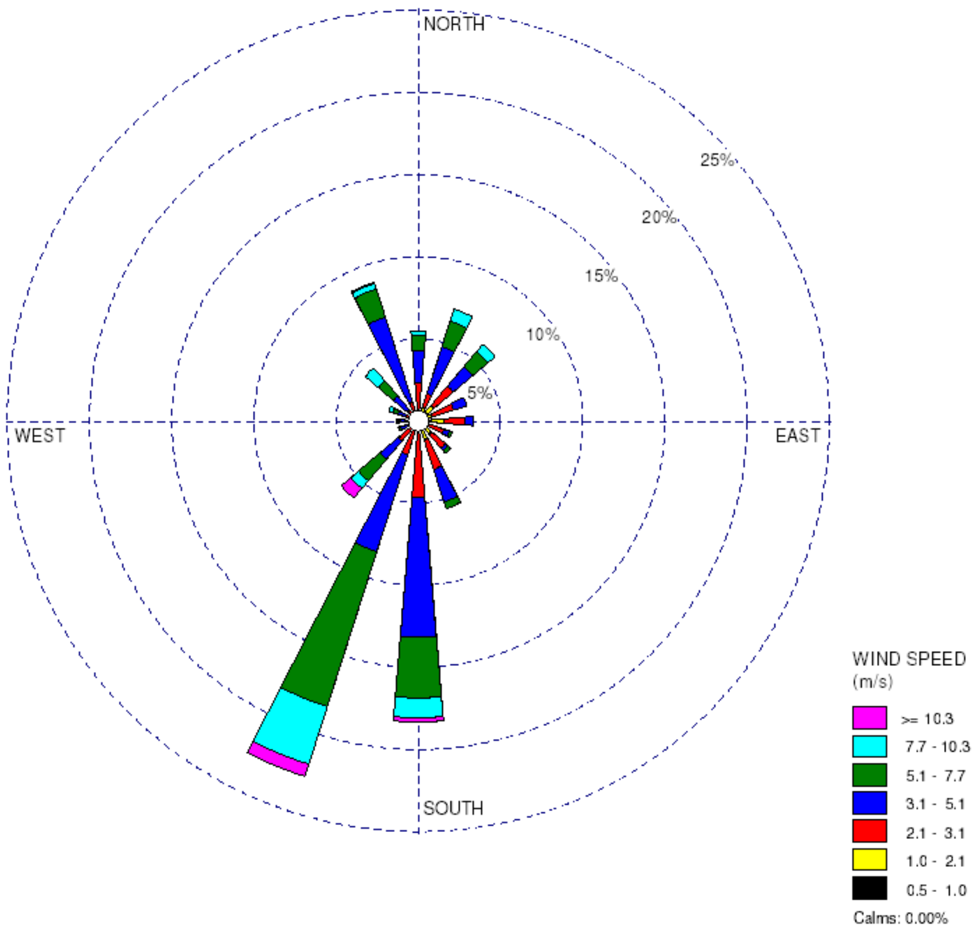

| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 10 meter level for nighttime hours during the Fall. | | COMPANY NAME:<br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br>**M. Stresing** | ENSR \| AECOM |
| | CALM WINDS:<br>**0.00%** | TOTAL COUNT:<br>**1092 hrs.** | |
| | AVG. WIND SPEED:<br>**4.64 m/s** | DATE:<br>**6/26/2007** | PROJECT NO.:<br>**10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Spring Daytime Plot**
**4/20/2006 - 5/31/2006 and 3/1/2007 - 4/30/2007 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**



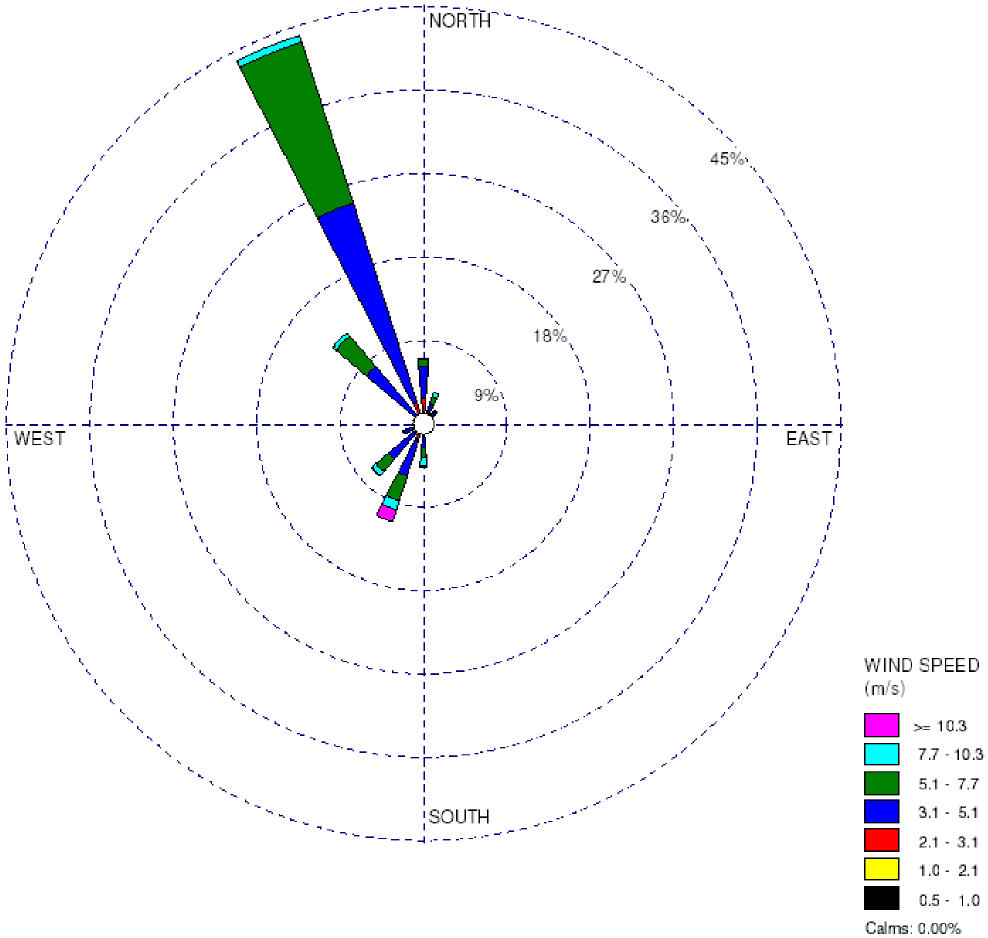

| COMMENTS: | | COMPANY NAME: | |
|---|---|---|---|
| Plot represents the 10 meter level for daytime hours during the spring. | | **Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER: **M. Stresing** | ENSR AECOM |
| | CALM WINDS: 0.00% | TOTAL COUNT: 1166 hrs. | |
| | AVG. WIND SPEED: 4.59 m/s | DATE: 6/26/2007 | PROJECT NO.: **10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Spring Nighttime Plot**
**4/20/2006 - 5/31/2006 and 3/1/2007 - 4/30/2007 - 10 meter Level**

DISPLAY:

Wind Speed
Direction (blowing from)



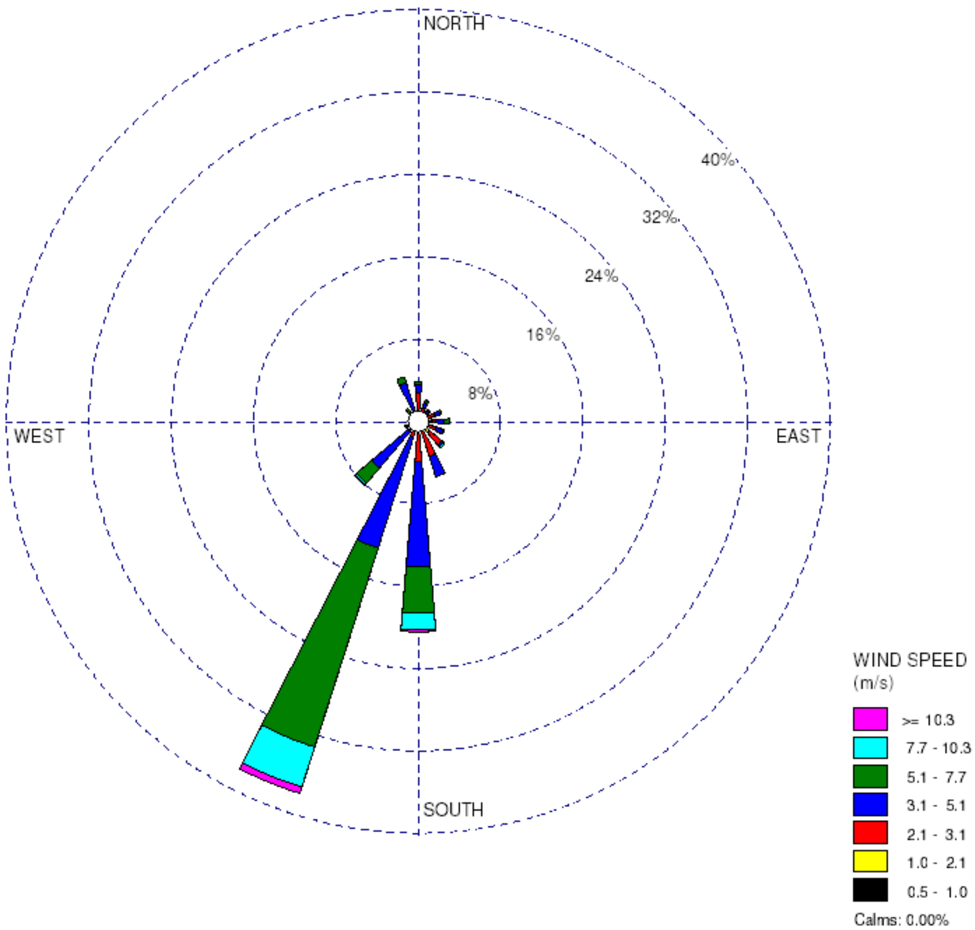

| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 10 meter level for nighttime hours during the spring. | | COMPANY NAME:<br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br>**M. Stresing** | ENSR \| AECOM |
| | CALM WINDS:<br>0.00% | TOTAL COUNT:<br>1176 hrs. | |
| | AVG. WIND SPEED:<br>4.68 m/s | DATE:<br>6/26/2007 | PROJECT NO.:<br>**10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Summer Daytime Plot**
**06/1/2006 - 8/31/2006 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**



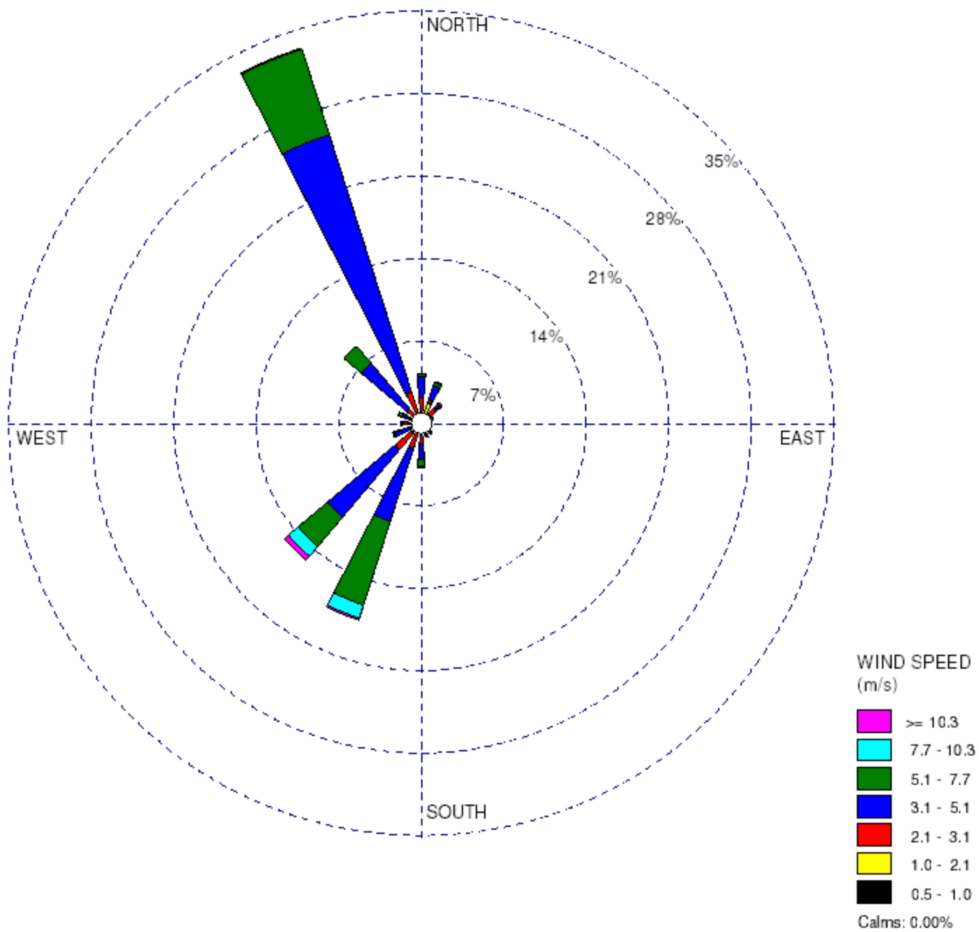

| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 10 meter level for daytime hours during the summer. | | COMPANY NAME:<br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br>**M. Stresing** | ENSR AECOM |
| | CALM WINDS:<br>**0.00%** | TOTAL COUNT:<br>**1103 hrs.** | |
| | AVG. WIND SPEED:<br>**4.61 m/s** | DATE:<br>**6/26/2007** | PROJECT NO.:<br>**10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Summer Nighttime Plot**
**06/01/2006 - 08/31/2006 - 10 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

Plot represents the 10 meter level for nighttime hours during the summer.

COMPANY NAME:

**Toquop Energy, LLC - Toquop Energy**

MODELER:

**M. Stresing**

ENSR | AECOM

CALM WINDS:

**0.00%**

TOTAL COUNT:

**1104 hrs.**

AVG. WIND SPEED:

**4.29 m/s**

DATE:

**6/26/2007**

PROJECT NO.:

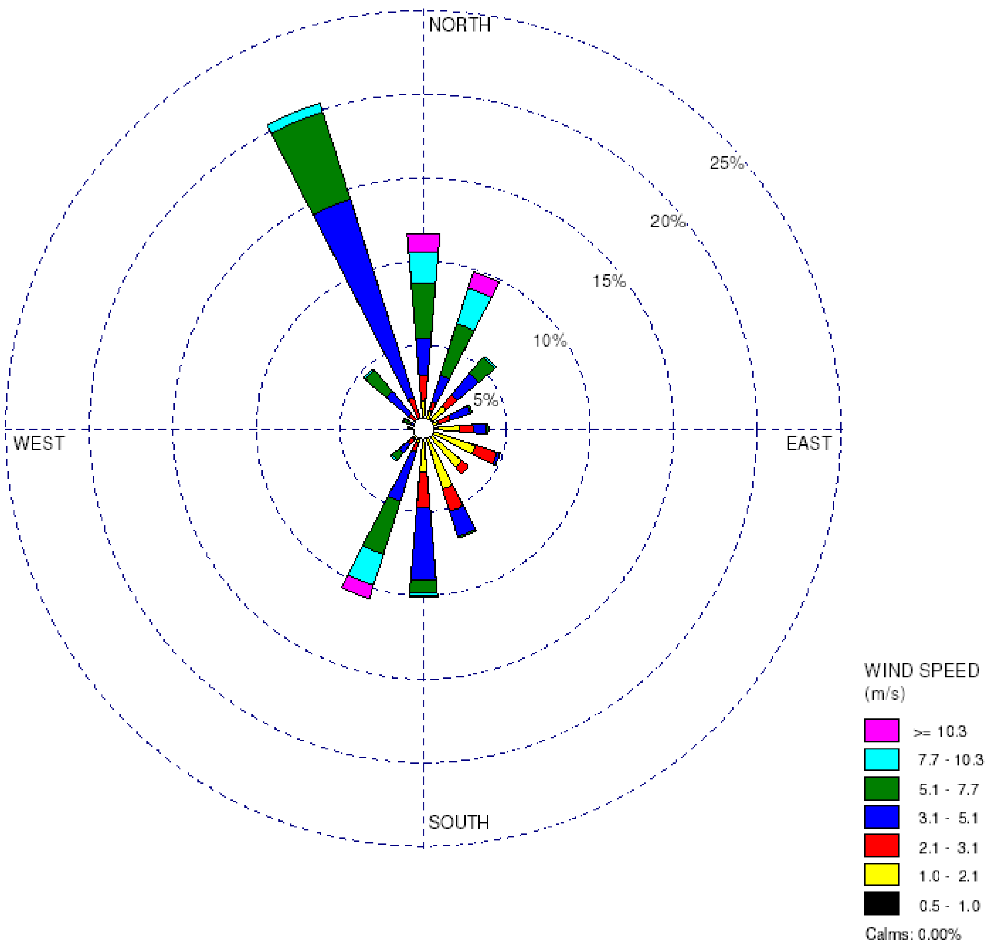
**10784-004-200**

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Winter Daytime Plot**
**12/1/2006 - 2/28/2007 - 10 meter Level**

DISPLAY:

Wind Speed
Direction (blowing from)




COMMENTS:

Plot represents the 10 meter level for daytime hours during the winter.

COMPANY NAME:

Toquop Energy, LLC - Toquop Energy

MODELER:

M. Stresing

ENSR | AECOM

CALM WINDS:

0.00%

TOTAL COUNT:

1080 hrs.

AVG. WIND SPEED:

4.31 m/s

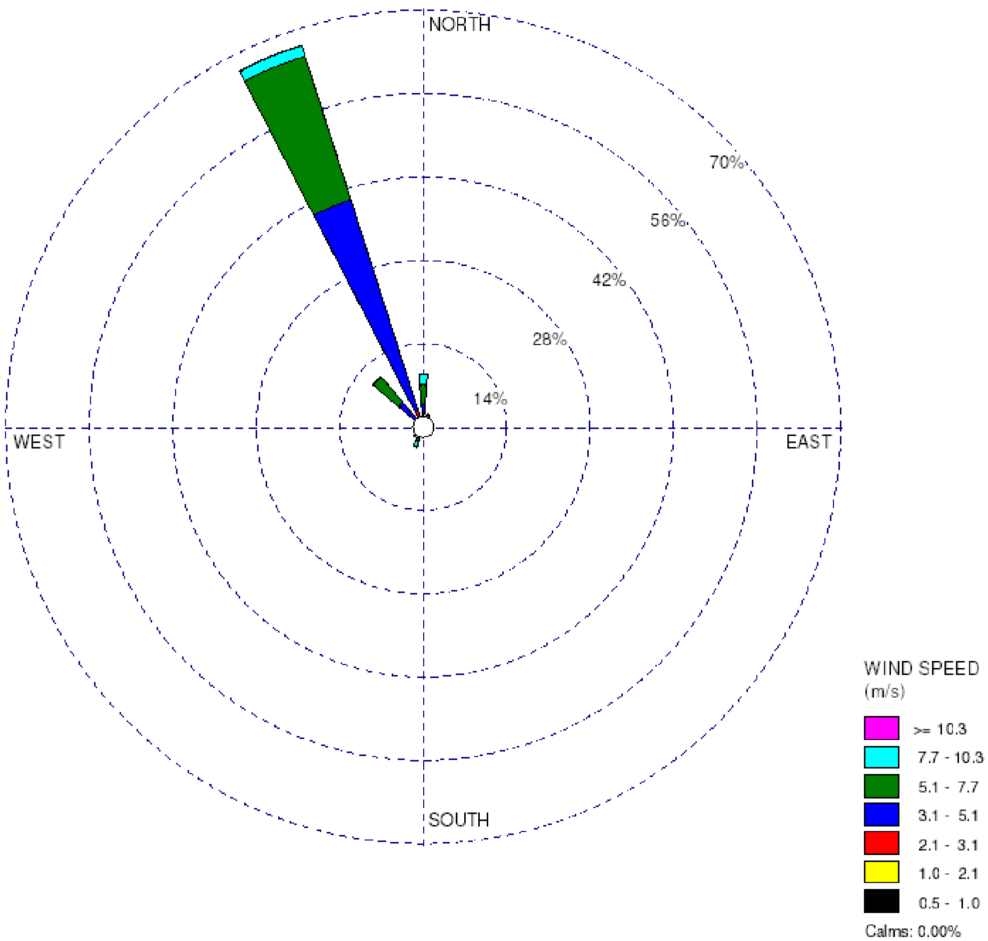
DATE:

6/26/2007

PROJECT NO.:

10784-004-200

| WIND ROSE PLOT: | DISPLAY: |
| --- | --- |
| Wind Rose Based for Toquop Tower - Winter Nighttime Plot<br>12/1/2006 - 2/28/2007 - 10 meter Level | Wind Speed<br>Direction (blowing from) |

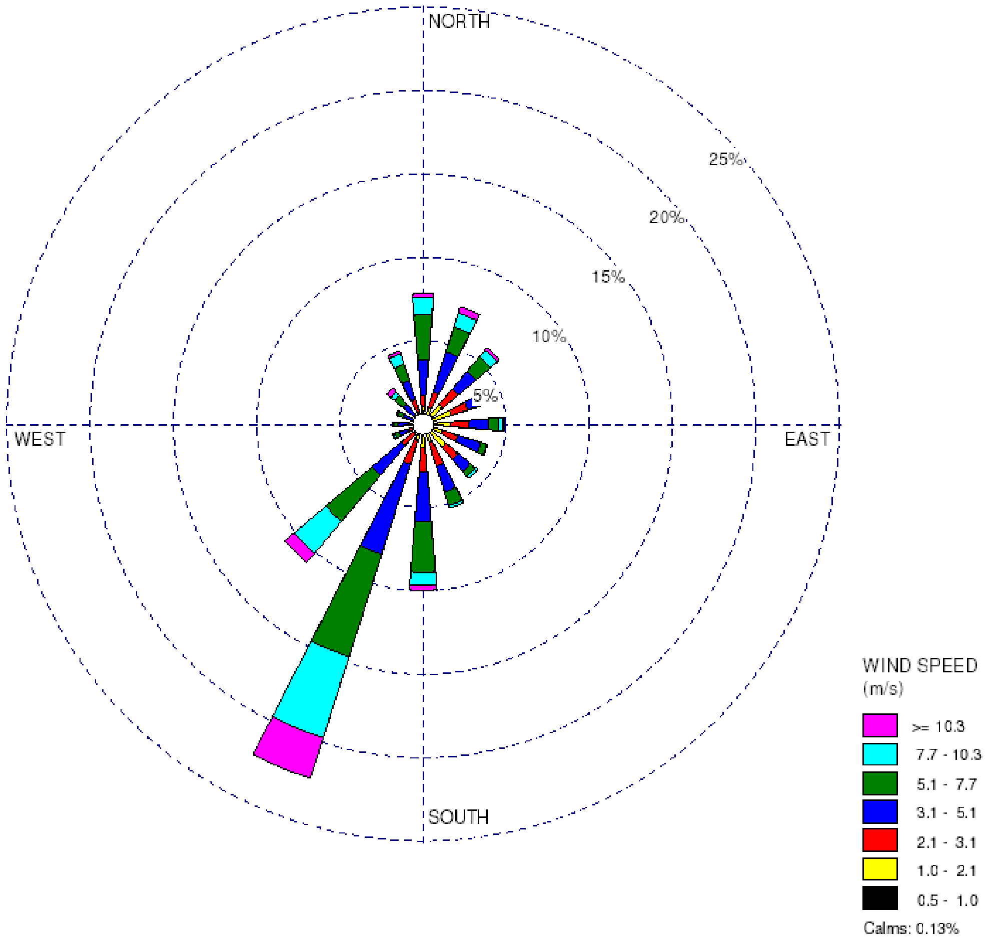



| COMMENTS: | | COMPANY NAME: | |
| --- | --- | --- | --- |
| Plot represents the 10 meter level for nighttime hours during the winter. | | Toquop Energy, LLC - Toquop Energy | |
| | | MODELER: M. Stresing | ENSR AECOM |
| | CALM WINDS: 0.00% | TOTAL COUNT: 1080 hrs. | |
| | AVG. WIND SPEED: 4.97 m/s | DATE: 6/26/2007 | PROJECT NO.: 10784-004-200 |

## WIND ROSES FOR THE 225-M LEVEL

WIND ROSE PLOT:
Wind Rose Based for Toquop Tower - Daytime Plot
4/20/2006 - 4/30/2007 - 225 meter Level

DISPLAY:
Wind Speed
Direction (blowing from)



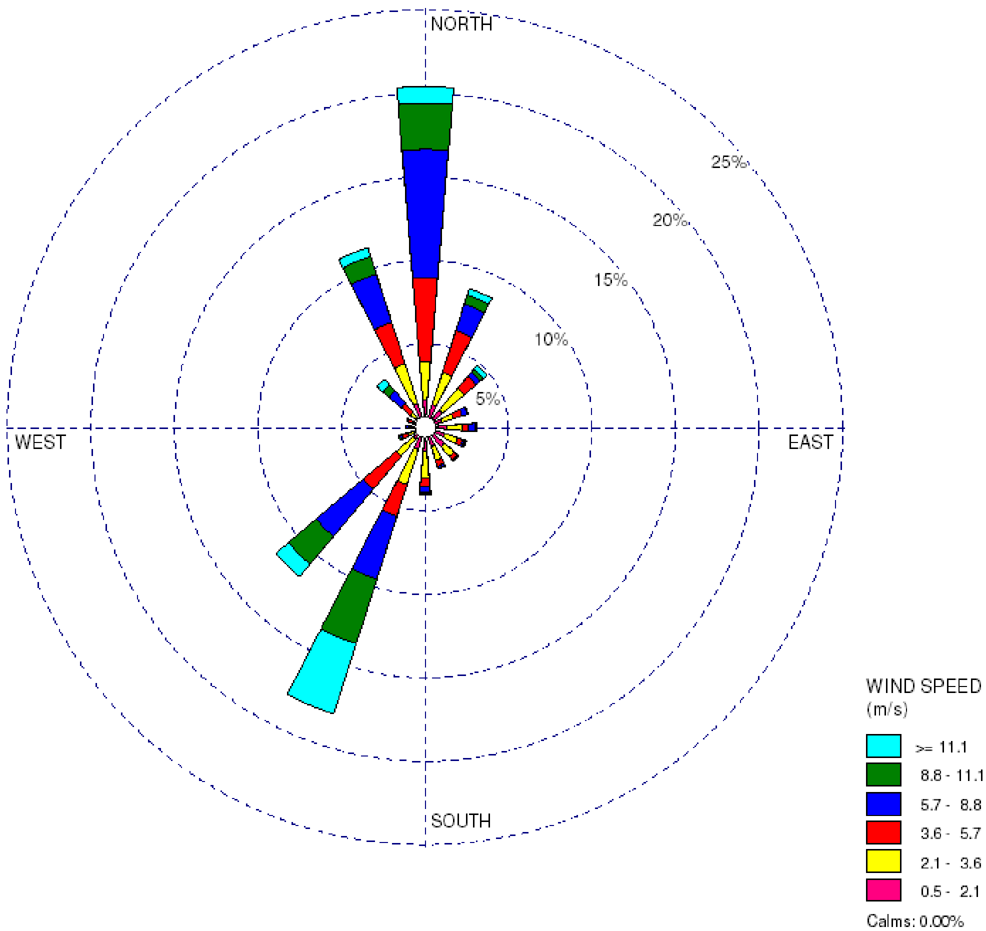

| | | | |
|---|---|---|---|
| COMMENTS: Plot represents the 225 meter level for daytime hours only. | | COMPANY NAME: Toquop Energy, LLC - Toquop Energy | |
| | | MODELER: M. Stresing | ENSR AECOM |
| | CALM WINDS: 0.13% | TOTAL COUNT: 3073 hrs. | |
| | AVG. WIND SPEED: 4.97 m/s | DATE: 6/26/2007 | PROJECT NO.: 10784-004-200 |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Nighttime Plot**
**4/20/2006 - 4/30/2007 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

Plot represents the 225 meter level for all nighttime hours.

COMPANY NAME:

**Toquop Energy LLC - Toquop Energy**

MODELER:

**M. Stresing**

ENSR | AECOM

CALM WINDS:

0.00%

TOTAL COUNT:

3242 hrs.

AVG. WIND SPEED:

5.63 m/s

DATE:

6/27/2007

PROJECT NO.:

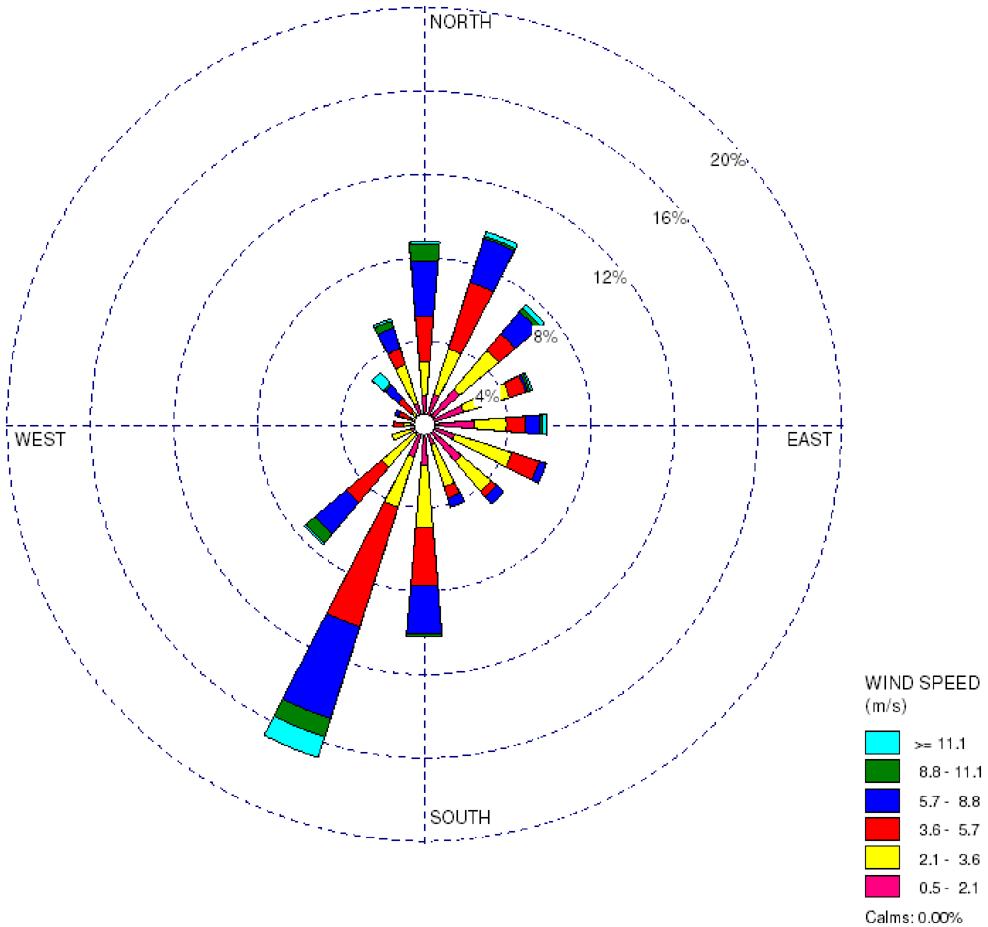
**10784-004-200**

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Fall Daytime Plot**
**9/1/2006 - 11/30/2006 - 225 meter Level**

DISPLAY:

Wind Speed
Direction (blowing from)



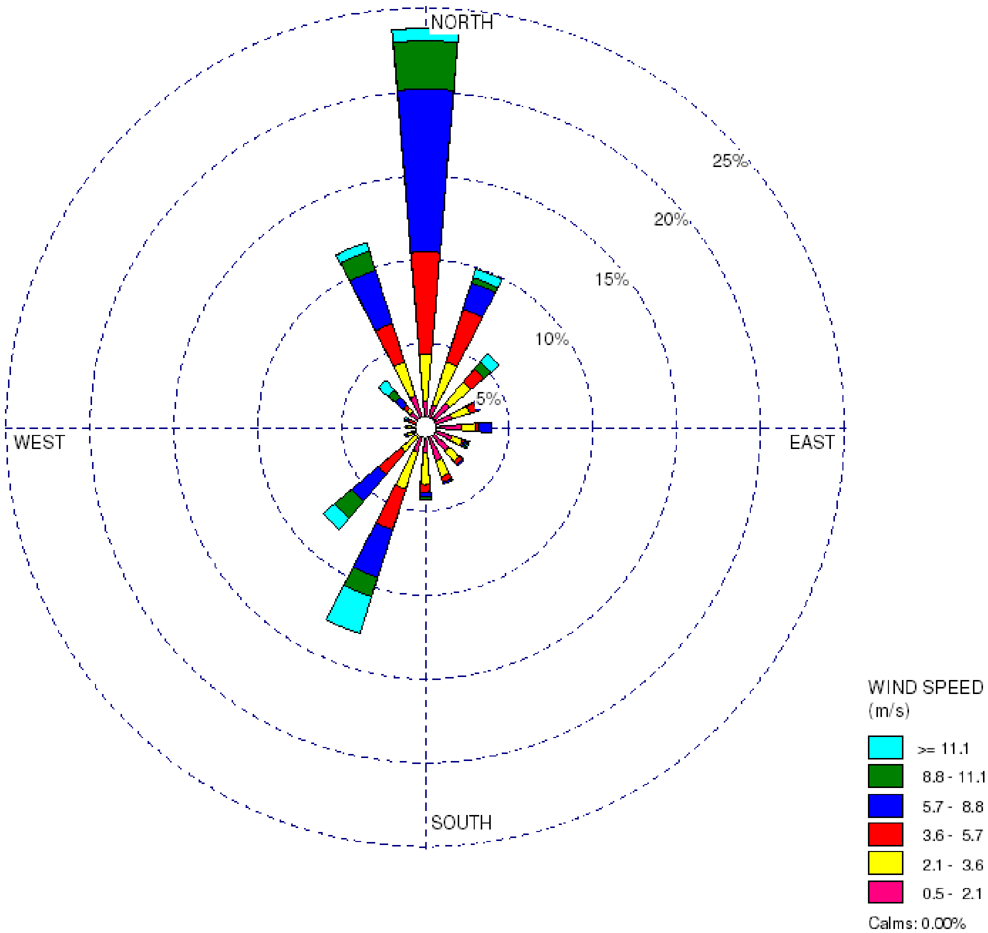

| | | | |
|---|---|---|---|
| COMMENTS:<br>Plot represents the 225 meter level for daytime hours during the fall. | | COMPANY NAME:<br>Toquop Energy LLC - Toquop Energy | |
| | | MODELER:<br>M. Stresing | ENSR \| AECOM |
| | CALM WINDS:<br>0.00% | TOTAL COUNT:<br>867 hrs. | |
| | AVG. WIND SPEED:<br>4.38 m/s | DATE:<br>6/27/2007 | PROJECT NO.:<br>10784-004-200 |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Fall Nighttime Plot**
**9/1/2006 - 11/30/2006 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

**Plot represents the 225 meter level for nighttime hours during the fall.**

COMPANY NAME:

**Toquop Energy LLC - Toquop Energy**

MODELER:

**M. Stresing**

CALM WINDS:

**0.00%**

TOTAL COUNT:

**910 hrs.**

AVG. WIND SPEED:

**5.16 m/s**

DATE:

**6/27/2007**

PROJECT NO.:

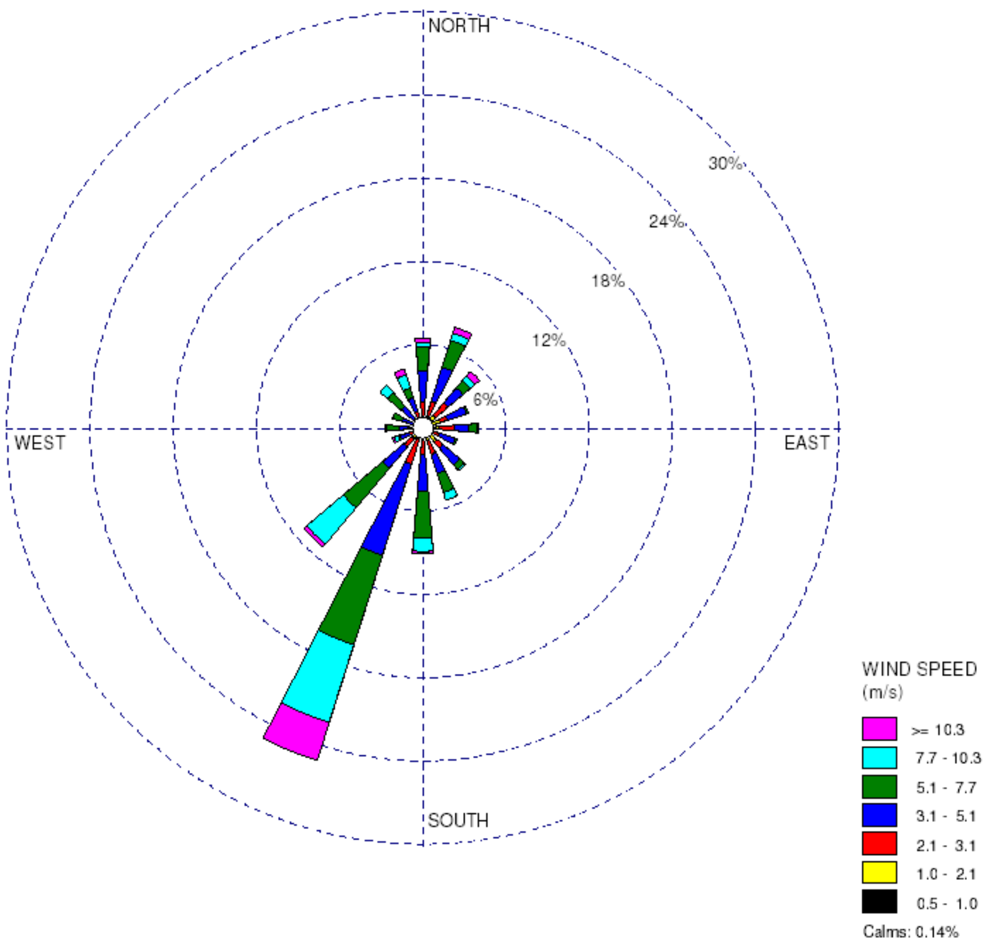
**10784-004-200**

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Spring Daytime Plot**
**4/20/2006 - 5/31/2006 and 3/1/2007 - 4/30/2007 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

Plot represents the 225 meter level for daytime hours during the spring.

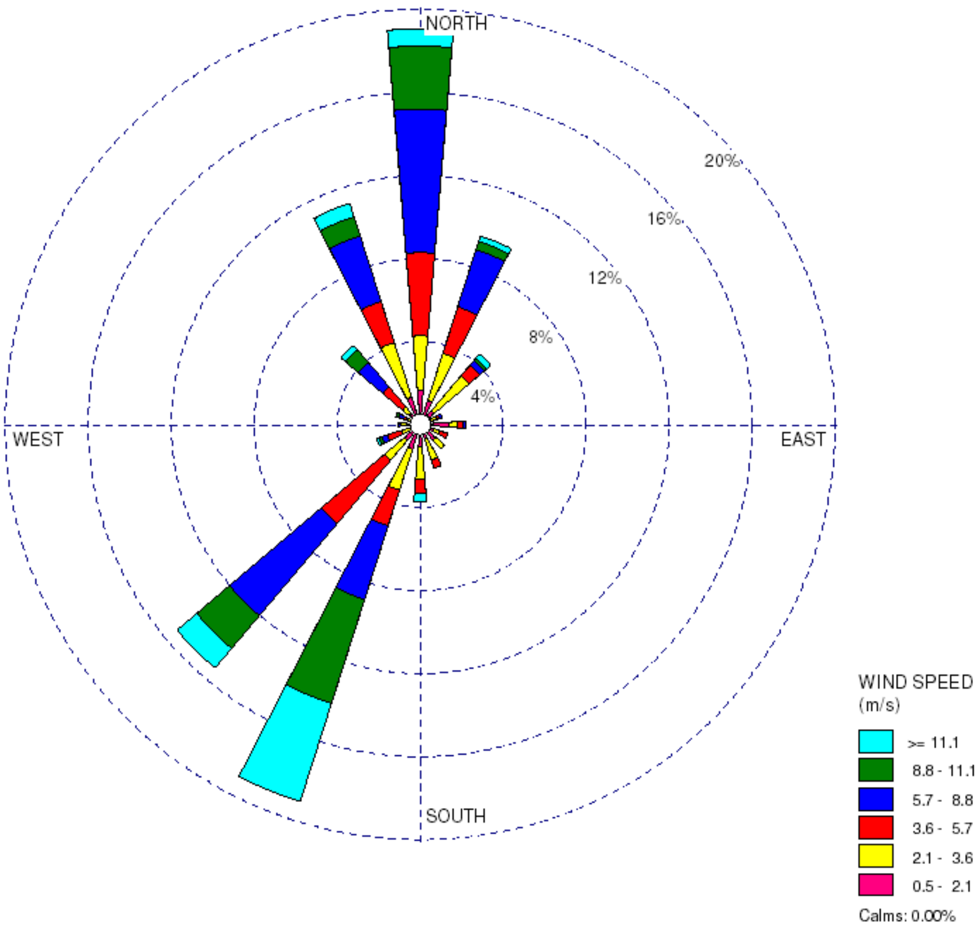
| | |
|---|---|
| COMPANY NAME: | **Toquop Energy, LLC - Toquop Energy** |
| MODELER: | **M. Stresing** |
| CALM WINDS: | **0.14%** |
| TOTAL COUNT: | **698 hrs.** |
| AVG. WIND SPEED: | **5.17 m/s** |
| DATE: | **6/26/2007** |
| PROJECT NO.: | **10784-004-200** |

ENSR | AECOM

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Spring Nighttime Plot**
**4/20/2006 - 5/31/2006 and 3/1/2007 - 4/30/2007 - 225 meter Level**

DISPLAY:
**Wind Speed**
**Direction (blowing from)**



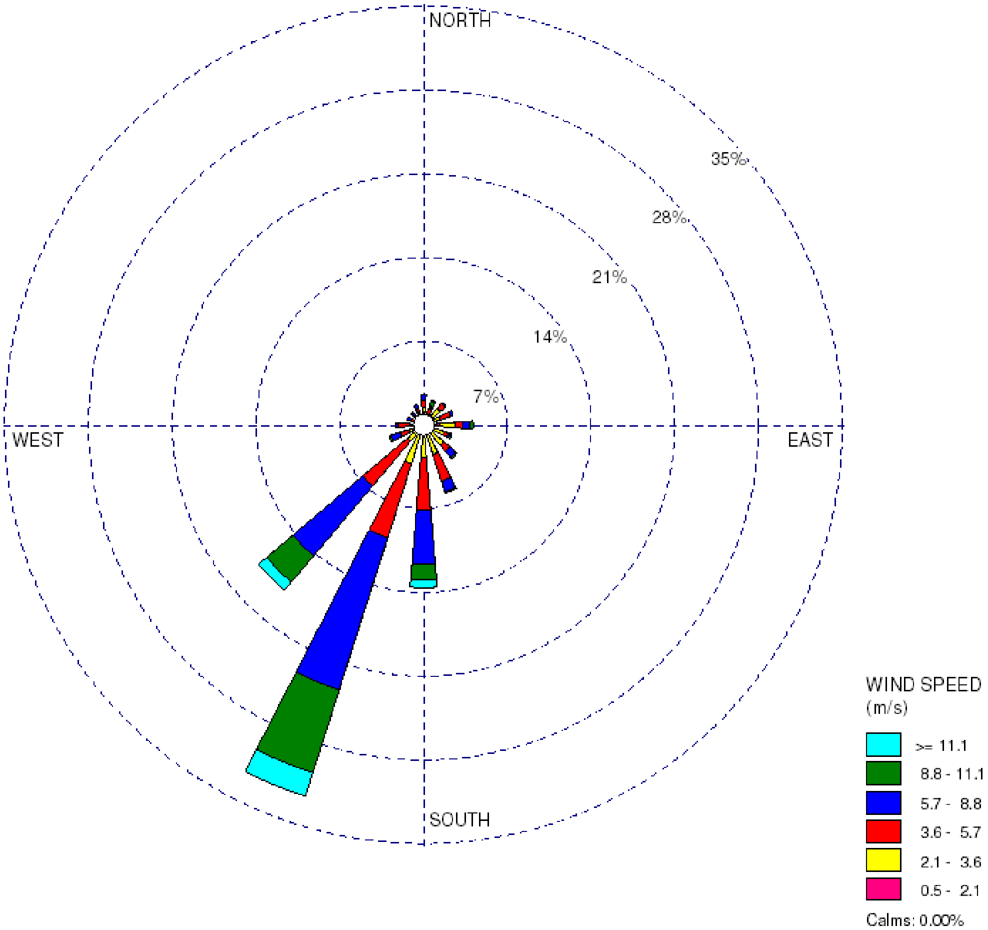

| | | | |
|---|---|---|---|
| COMMENTS: Plot represents the 225 meter level for nighttime hours during the spring. | | COMPANY NAME: **Toquop Energy LLC - Toquop Energy** | |
| | | MODELER: **M. Stresing** | ENSR AECOM |
| | CALM WINDS: **0.00%** | TOTAL COUNT: **726 hrs.** | |
| | AVG. WIND SPEED: **5.95 m/s** | DATE: **6/27/2007** | PROJECT NO.: **10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Summer Daytime Plot**
**6/1/2006 - 8/31/2006 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**



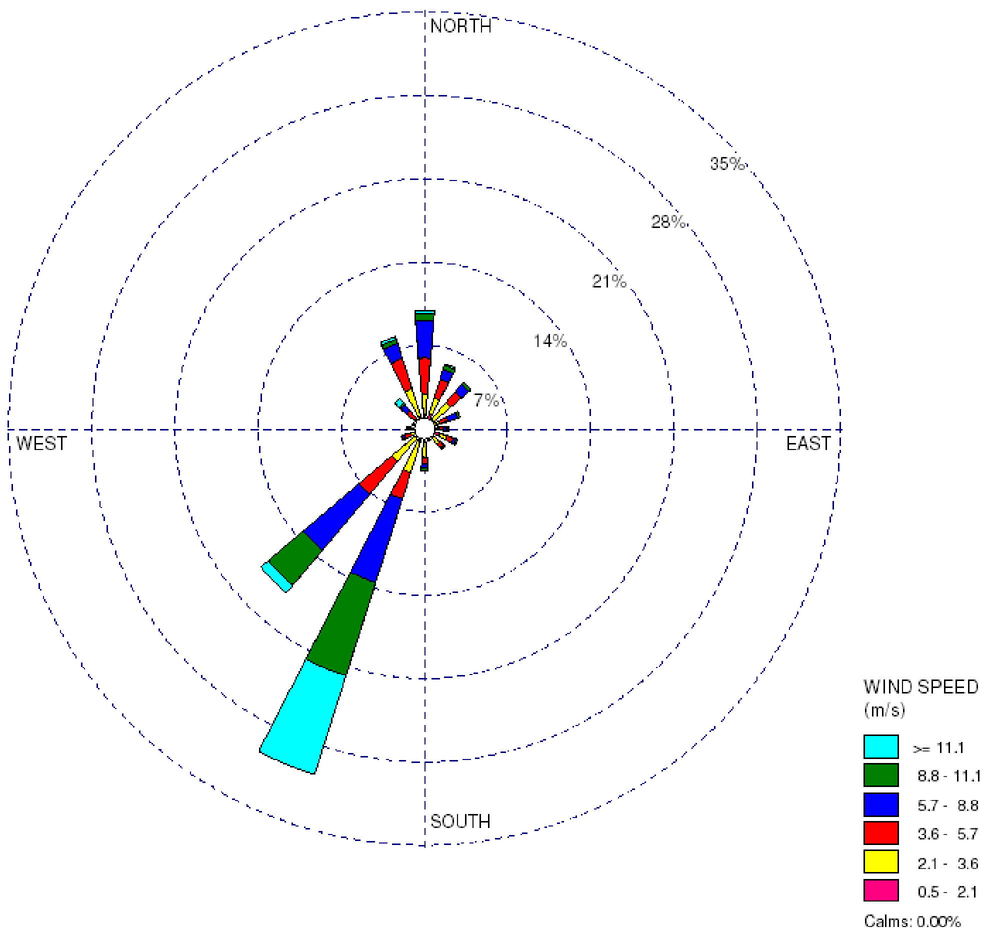

| | | | |
|---|---|---|---|
| COMMENTS: Plot represents the 225 meter level for daytime hours during the summer. | | COMPANY NAME: Toquop Energy LLC - Toquop Energy | |
| | | MODELER: M. Stresing | ENSR AECOM |
| | CALM WINDS: 0.00% | TOTAL COUNT: 773 hrs. | |
| | AVG. WIND SPEED: 5.75 m/s | DATE: 6/27/2007 | PROJECT NO.: 10784-004-200 |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Summer Nighttime Plot**
**6/1/2006 - 8/31/2006 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

**Plot represents the 225 meter level for nighttime hours during the summer.**

COMPANY NAME:

**Toquop Energy LLC - Toquop Energy**

MODELER:

**M. Stresing**

ENSR | AECOM

CALM WINDS:

**0.00%**

TOTAL COUNT:

**829 hrs.**

AVG. WIND SPEED:

**6.10 m/s**

DATE:

**6/27/2007**

PROJECT NO.:

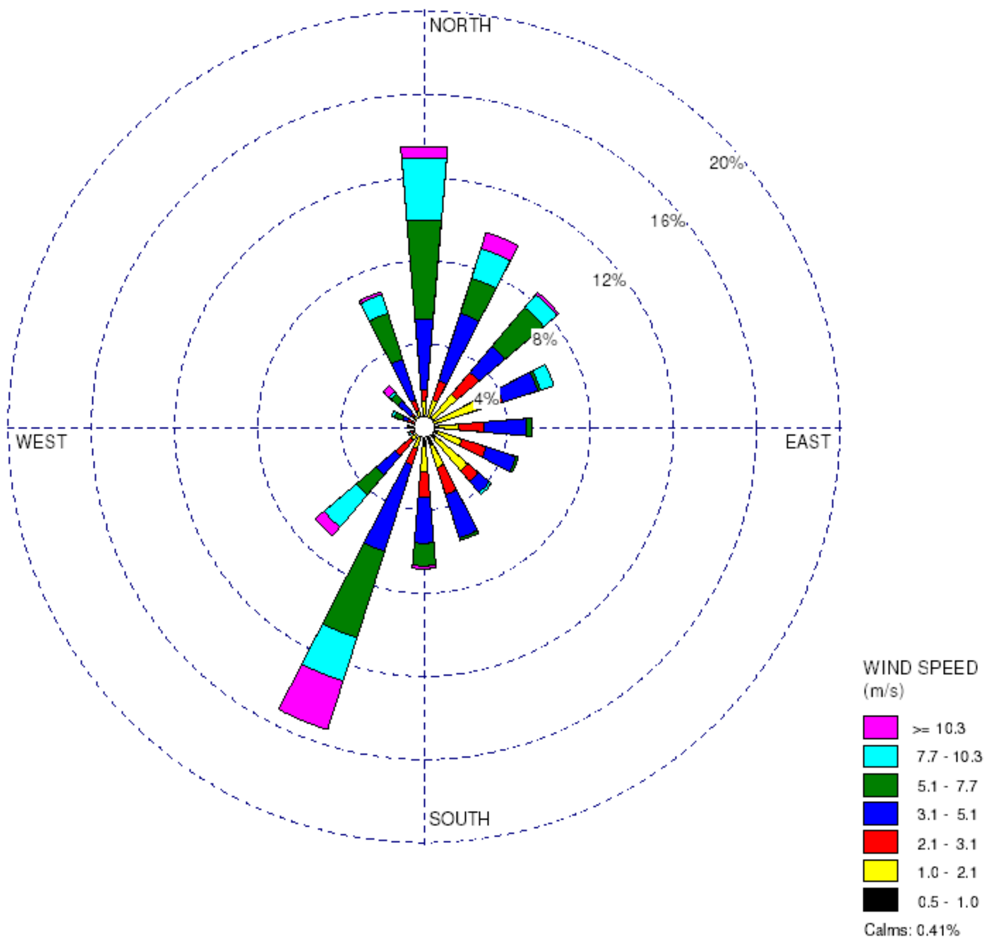
**10784-004-200**

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Winter Daytime Plot**
**12/1/2006 - 2/28/2007 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**



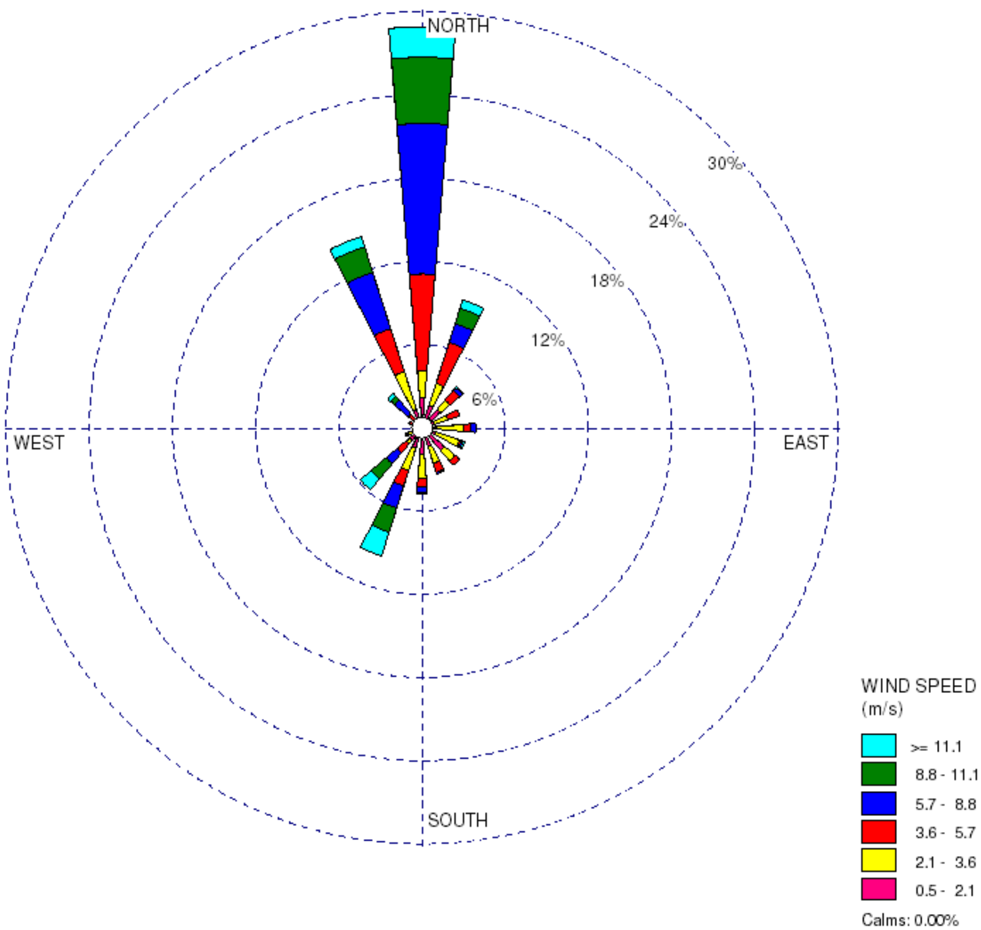

| | | | |
|---|---|---|---|
| COMMENTS:<br><br>Plot represents the 225 meter level for daytime hours during the winter. | | COMPANY NAME:<br><br>**Toquop Energy, LLC - Toquop Energy** | |
| | | MODELER:<br><br>**M. Stresing** | ENSR \| AECOM |
| | CALM WINDS:<br><br>**0.41%** | TOTAL COUNT:<br><br>**735 hrs.** | |
| | AVG. WIND SPEED:<br><br>**4.67 m/s** | DATE:<br><br>**6/26/2007** | PROJECT NO.:<br><br>**10784-004-200** |

WIND ROSE PLOT:

**Wind Rose Based for Toquop Tower - Winter Nighttime Plot**
**12/1/2006 -2/28/2007 - 225 meter Level**

DISPLAY:

**Wind Speed**
**Direction (blowing from)**




COMMENTS:

**Plot represents the 225 meter level for nighttime hours during the winter.**

COMPANY NAME:

**Toquop Energy LLC - Toquop Energy**

MODELER:

**M. Stresing**

ENSR | AECOM

CALM WINDS:

**0.00%**

TOTAL COUNT:

**777 hrs.**

AVG. WIND SPEED:

**5.40 m/s**

DATE:

**6/27/2007**

PROJECT NO.:

**10784-004-200**

**REVISED FEDERAL LAND MANAGERS GUIDANCE ON SCREENING PROCEDURES FOR A CLASS I MODELING BACKGROUND SOUECES INVENTORY**

**APRIL 2006**

**Class I Cumulative Increment Inventory: Guidance for determining the increment-consuming/ expanding sources to include in the Prevention of Significant Deterioration (PSD) analysis.**

The federal land managing agencies that administer Class I areas under the Clean Air Act (i.e., National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, hereafter referred to as the Agencies) revisited concerns about including all PSD increment-consuming and expanding sources in cumulative increment analyses for Class I areas. The Agencies have turned to the PSD regulations, the New Source Review Workshop Manual, and U.S. Environmental Protection Agency's (USEPA's) specific guidance to determine how cumulative increment analyses should be conducted for Class I areas, and specifically which sources should be included in the inventory.

**Increment-Consuming/Expanding Sources**

The PSD regulations lay the foundation for conducting an increment analysis. An important step in the analysis is determining which emission sources should be included as increment-consuming or expanding sources. Both major sources and major modifications, which require a PSD permit to construct, and minor sources, which do not, can consume increment. However, the inclusion of minor sources in an increment consumption analysis is dependent on whether or not the Minor Source Baseline Date (MiSBD) has been triggered for the area(s) of concern. When the MiSBD is triggered by virtue of a significant impact from a major stationary source (or major modification) having submitted a complete application for a PSD permit, an associated baseline area is established. Baseline areas are defined in 40 Code of Federal Regulations 51.166 paragraph (b)(15)(i):

> *(b)(15)(i) Baseline area means any intrastate area (and every part thereof) designated as attainment or unclassifiable under Section 107(d) (1) (D) or (E) of the Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact equal to or greater than 1 μg/m$^3$ (annual average) of the pollutant for which the minor source baseline date is established.*

Thus, the MiSBD for each of the Section 107 area(s) that include all or part of a Class I area determines the minor source baseline date for that part of the Class I area. These are the *only* MiSBD relevant to the Class I area of concern.[1] If the MiSBD has been triggered for the Section 107 area(s) in which the Class I area is located, then minor sources from any such area should be evaluated to determine if their emissions significantly impact that portion of the Class I area and need to be included in the increment consumption analysis. In addition to the changes at major sources after the Major Source Baseline Date (MaSBD) described below, emission increases or decreases that occur at all sources after the Class I MiSBD are

[1] See attached 4/5/99 EPA memo.

included in the analyses. (This includes ALL sources, not just minors, and ANY change in actual emissions should be captured, not just those associated with a physical change or change in method of operation.)

Guidance on increment-consuming sources is provided by USEPA's New Source Review Workshop Manual (Chapter C, II.E):

> *Emissions increases that consume a portion of the applicable increment are, in general, all those not accounted for in the baseline concentration and specifically include*
>
> - *actual emissions increases occurring after the* ***major source baseline date****, which are associated with physical changes or changes in the method of operation (i.e., construction) at a major stationary source*; and
> - *actual emissions increases at any stationary source, area source, or mobile source occurring after the* ***minor source baseline date****.*

So, the first bullet applies to major stationary sources before the MiSBD has been triggered, while the second applies to all sources after it has been triggered.

In many situations, a Class I area may reside in several Section 107 areas, and it is possible that not all parts of every Class I area are located in a Section 107 area in which the MiSBD has been triggered. While major sources consume increment in affected Section 107 areas after the MaSBD, minor sources consume increment in the portion(s) of the Class I area only where the MiSBD has been triggered. In those portions of the Class I area located in Section 107 areas that are not minor source baseline areas, minor sources would not consume increment. It is possible then, for certain minor sources to consume increment in some portions of a Class I area and not consume increment in other portions of the same Class I area. In this situation, two inventories would need to be developed for a Class I analysis. For those sections of the Class I area where the MiSBD has not been triggered, only major sources that have undergone a physical or operational change after the MaSBD would be included in the inventory. A second inventory including major *and* minor sources would need to be compiled for those sections of the Class I area where the MiSBD has been triggered**.** Different dates may apply for individual baseline areas when more than one exists for a particular Class I area.

Next, the Class I area would be subdivided into areas where the MiSBD has been triggered and where it has not, and the actual baseline dates for each triggered Section 107 area would be determined. A Class I increment-consumption modeling analyses would be completed for each subdivision, using the appropriate inventory and MiSBD.

For example, Dolly Sods, Otter Creek and James River Face Wildernesses each are in portions of two Section 107 areas. Shenandoah National Park is in portions of eight Section 107 areas. The first step in conducting an increment analysis for these four Class I areas would be to determine in which of the Section 107 areas in which they are located has a MiSBD been triggered, and if so, for which pollutant(s). If the MiSBD has been triggered, the relevant date needs to be determined for each pollutant. Next, emissions inventories for the pollutants of concern would need to be compiled and an increment analysis conducted based on the methodology described above.

***The Geographic Extent of Source Inventories***

The Agencies believe that the geographic extent of the source inventory (in essence the modeling domain) must be based on Class I areas of concern, rather than the location of the proposed facility. (See Figure 1.) The following recommendations provide a size vs. distance approach where smaller increment-consuming stationary sources[2] are included only when they are located near the Class I areas. The recommendations are detailed as follows:

a. A stationary source will be included in the inventory if annual actual PM10 emissions in tons per year exceed 0.3 times the distance to the Class I area in km, or SO2 or NOx emissions in tons per year exceed 0.8 times the distance to the Class I area in km.

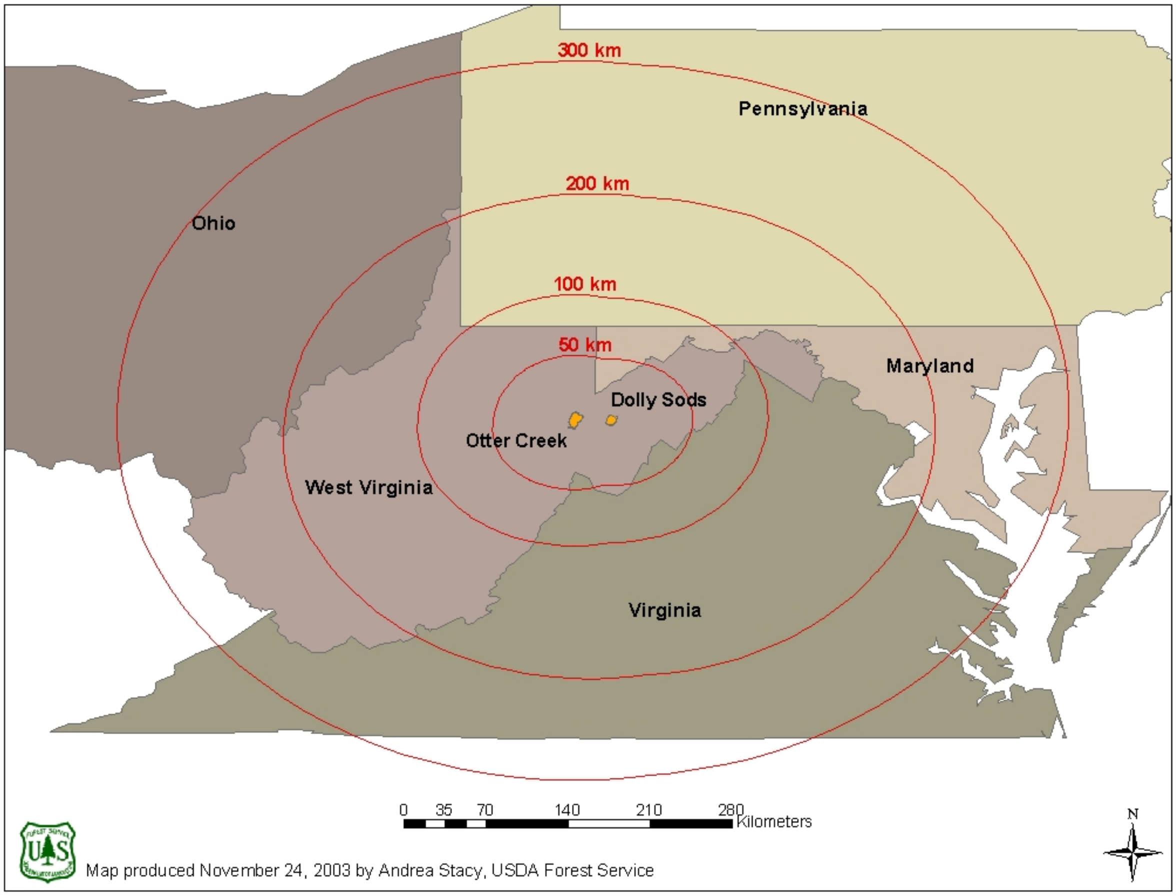
b. At the Agencies' discretion, the cumulative inventory may eliminate sources beyond 50 km that are on the opposite side of the Class I area from the stationary source in question. This recognizes that distant stationary sources on the opposite side may or may not have a combined cumulative effect in the Class I area on any given day.

c. The cumulative inventory may include large stationary sources that are located at distances of 200 km to 300 km from the Class I areas.

d. Area and mobile sources within 50 km of the Class I area should be included if the local air pollution control authority concludes that there is a potential for changes in emissions from these sources to affect increment.

[2] A "stationary source" means any building, structure, facility, or installation which emits or may emit any air pollutant subject to regulation under the Act.

**Figure 1 Recommended Basic Geographic Extent for a "Gradient" Cumulative Source Inventory Based on the Class I Areas as the Center**



# ATTACHMENT 8A-2
# RESPONSES TO BAPC MODELING REVIEW – APRIL 2007

**Responses to NDEP Modeling Review for the Toquop Energy Project**
**April 6, 2007**

**ENSR Corporation, on behalf of Sithe Global**
**July 9, 2007**

The Nevada Division of Environmental Protection – Bureau of Air Pollution Control (NDEP BAPC) reviewed the Class I and Class II Modeling Protocol and Report submitted by Toquop Energy, LLC (Toquop) on February 12, 2007, and provided comments dated April 6, 2007. As stated by the NDEP, this review was conducted to identify any areas where the modeling protocol or report required additional comment or clarification.

The comments are reproduced below, along with our responses in *italics*. The final modeling submittal (provided separately) based upon the on-site meteorological data program that ended on April 30, 2007, addresses each of these comments, as appropriate.

**Class II Protocol**

The review began with the portion of Appendix 12-B titled Air Quality Dispersion Modeling Protocol (Revised) – Class II Area Impacts and Appendix A Responses to NDEP Comments on the Toquop Class II Modeling Protocol.

**Appendix A Comments**

1. ENSR's response to NDEP comment 1. Raw on-site and St. George meteorological data were not included on the modeling files CD included with this submittal.

   ***Response**: Raw on-site data is included in the final modeling archive in the "onsite met data" folder. St. George cloud cover data is also included in the modeling archive in the "cloud cover" folder.*

2. ENSR's response to NDEP comment 3. The modeling report does not identify which data were disqualified from the on-site meteorological data set.

   ***Response**: Wind field plots (time vs. height) were created for every day of the measurement period. The plots were then printed and visually inspected. Data values that showed a large deviation from those of neighboring values in height and time were subject to disqualification. Wind field plots for every day of the monitoring period are included in the Class II modeling archive in "onsite data" folder and "4.impage files and animations" subfolder. A separate document called "Readme - Onsite Data QA Procedures.doc" discusses how the wind fields were generated and is included in the modeling archive.*

3. NDEP comment 5. The precipitation data and calculations used to evaluate the Bowen ratio were not included in the protocol or report, only a table indicating whether the months were average, wet, or dry was shown. The spreadsheet included on the CD under the AERMET subdirectory presents data and calculations from Cedar City, Utah.

***Response**: We used Overton, NV as the COOP station to evaluate the site's Bowen ratio. The precipitation data is included in the modeling archive in the "precipitation data" folder. Any reference to the previous use of Cedar City, UT has been removed.*

4. NDEP comments 9 and 10. Toquop needs to include the NPS-approved PSD screening procedure and BLM EIS references in the modeling protocol and report.

   ***Response**: The NPS-approved procedures for screening background sources are included in an appendix of the Class II modeling report (Appendix 8A of the permit application). BLM EIS is provided in the reference section of the report. The reference also is listed below:*

   *Bureau of Land Management. 2003. Proposed Toquop Land Disposal Amendment to the Caliente Management Framework Plan and Final Environmental Impact Statement for the Toquop Energy Project, 2003. United States Department of the Interior Bureau of Land Management.*

**<u>Class II Protocol Comments</u>**

1. Section 3.2.2 Justify why hourly meteorological observations (i.e. cloud cover) from St. George, Utah are deemed representative of conditions at the application site. A comparison of long-term climate data (monthly precipitation) and monitoring site geography (elevation, surrounding land forms, vegetation) would be appropriate. St. George appears to be at a higher elevation in more mountainous terrain and within a different eco-region that receives more annual rainfall than the proposed application site. Toquop needs to evaluate whether other surface stations are more representative of the application site meteorology.

   Provide the St. George surface data files. This data is not on the CD, as an input file was not found. Visual inspection of the on-site data provided on the CD shows that cloud cover and solar radiation don't always track as well as expected.

   ***Response**: We reviewed NOAA Climate Atlas data such as isopleths of annual mean sunshine hours, annual mean clear days and cloudy days (provided in an appendix of the Class II modeling report) which supports our use of St. George, Utah as a representative site for cloud cover observations.*

   *The primary reason for selecting St. George for cloud cover data is proximity to the meteorology site. St. George airport is about 40 miles east of the monitoring site. The next closest candidate is Nellis AFB, but it is much further away at about 70 miles southwest of the site. Elevation is another concern. Nellis AFB elevation is about 2000 feet, while the site elevation is about 2800 feet and St. George is at 2880 feet. The Mormon Mountains with elevations above 7400 feet lie west of the monitoring site. The Mormon Range in Utah lies west of St. George.*

   *Precipitation is another indicator of representative cloud cover. Precipitation records indicate that St. George and Mesquite receive about 6 inches of rain each year and Las Vegas receives only about 4.2 inches per year. So this would also indicate that cloud cover from St. George would be more representative than that from near Las Vegas.*

*St. George cloud cover data also is included in the modeling archive in the "cloud cover" folder.*

2. Section 3.2.3 Provide a reference documenting the use of visual inspection for reasonableness and consistency as a basis for disqualification of data. Define and quantify what constitutes an unreasonable or inconsistent reading. Identify all disqualified data and provide the raw on-site meteorological data. Quantify the data capture rate of the raw data, as well as the capture rate following disqualification of some data.

   ***Response**: See the response to this comment under item 2 of "Appendix A Comments".*

   *First, we plotted wind fields and visually inspected them, and then we used meteorological judgment to disqualify erroneous wind speed or wind direction.*

   *Raw on-site data is provided in the modeling archive in "onsite met data" folder and the edited on-site data is provided in the "AERMET" folder, in "onsite_06_07.dat" file.*

3. Section 3.2.3 Wind roses are provided at the 10-m and 200-m levels. Provide a wind rose at the 225-m level consistent with the top of the stack. Given the fact the 10-m capture rate is greater than 99% and the 200-m capture rate (based on the information provided on the wind rose plots) is approximately 75%, the statement that the low-level nocturnal drainage flow is absent at the 200m level is unfounded and cannot be supported by the data presented. This comment also applies to the discussion of wind patterns being influenced by the synoptic pattern and valley itself, made in section 3.2.2. The Data Period information presented on the wind rose plots needs to be corrected.

   ***Response**: Additional levels for wind roses, including the 225-m level, are provided in the modeling report and archive to better characterize the wind characteristics as a function of height. The updated wind roses are provided for the entire year of monitoring, with the data period described labeled appropriately.*

4. Section 3.2.4 AERMOD requires additional meteorological data beyond wind speed, direction, and temperature, as stated. Clarify the first paragraph of this section. Provide the aerial photos or a land use map used to evaluate the surface parameters. Reference the definition of desert shrubland. Figure 3-5 presents a topographic map and does not demonstrate land use. The discussion of weighted-average input boundary layer parameters to AERMET is confusing in light of the fact of uniform land use surrounding the site. Discuss the surface parameters in light of the use of one sector and a single land use. Please remove the references to weighted averages. Explain how land use classification can be made by inspecting topographic maps. The error in Table 3-4 under column Wet/Summer for the desert shrubland row needs to be corrected. See NDEP Comment 5 under Appendix A Comments. Include the values used in the calculations in Table 3-5. The values presented in Table 3-6 are not reflected by the stage 3 input file included on the CD under the AERMET subdirectory.

   ***Response**: The first paragraph of Section 3.2.4 was revised.*

   *Figures A8-2, A8-3, and A8-5 of the Class II modeling report depict the onsite tower surrounding area. The figures show that predominant land use is desert shrubland. Additionally, we created a Figure A8-9 which is based on the USGS land use and land cover grid data files. Figure A8-9 shows that the on-site tower* *falls in the USGS land use classification type of 31 to 33, which could be any of the following sub-categories: herbaceous rangeland (31), or shrub and brush rangeland (32), or mixed rangeland (33).*

*The 52-category USGS land use classification system can be found at [http://courses.washington.edu/urbdp467/html/classify.html](http://courses.washington.edu/urbdp467/html/classify.html)*

*As noted in the response to the next comment, we corrected a reference to weighted averages for surface characteristics (this is normally needed for heterogeneous sites, but is equivalent to selecting the single value for a site with only one land use type).*

*The error noted in Table 3-4 was corrected, and additional document, such as Overton, NV precipitation records, supporting the calculations in Table 3-5 are presented in the modeling archive in the "precipitation data" folder. The surface roughness, albedo, and Bowen ratio values presented in Table 3-6 were updated for the full year modeling.*

5. Section 3.2.5 Toquop needs to remove references to weighted-average input parameters, as identified in comment for Section 3.2.4.

   ***Response**: We updated the document to remove this reference.*

6. Section 3.5.1 – the receptor grid must include all areas adjacent to the facility that do not have access limited by a physical barrier such as a fenceline. Patrolled areas do not meet the NDEP requirement for a physical barrier. The receptor grid needs to be modified appropriately.

   ***Response**: The property boundary will have a physical barrier (fence) to restrict public access. This physical barrier will be located where the current receptor grid's fence line is defined as shown in Figures 3-6 and 3-8 of the Appendix 12B "Revised" modeling protocol.*

7. Section 4.3 Provide a reference for the screening procedure, as identified in Appendix A.

   ***Response**: We included the document regarding National Park Service-recommended background inventory screening procedures in the report appendix.*

8. Add a discussion regarding the use of emission estimates for short-and long-term averaging periods (i.e., explain what emission rates will be used to model for 3-hr, 8-hr, and 24-hr averaging periods versus emission estimates used for annual averaging periods) for the three types of model runs conducted. A table presenting these data in pounds per hour, tons per year, and grams per second would be helpful in understanding how emissions were used in modeling.

   ***Response**: A table of modeled emissions was included in Appendix 8A of the PSD application (see Tables 8A-10 through 8A-15). See the response to item 9 under "Class II Modeling Report" below for a more detailed discussion.*

**Class I Protocol**

Appendix 12-A titled Air Quality Dispersion Modeling Protocol (Revised) – Class I and Sensitive Class II Area Impacts was also briefly reviewed. Technical review of this document was left to the Federal Land Managers.

**Class I Protocol Comments**

1. Appendix C is mis-labeled as Appendix B.

   ***Response**: This has been corrected.*

**Modeling Reports and CD**

The final portions of Toquop Energy Project Class I-B Operation Permit to Construct Application I reviewed were Appendix 8A Class II Modeling Report and the accompanying CD with electronic files used for the modeling. Electronic files were given only minor scrutiny as these are subject to change with the final permit application.

***Response**: No response required.*

Comments are detailed below, some of which duplicate comments on Air Quality Dispersion Modeling Protocol (Revised) – Class II Area Impacts.

**Class II Modeling Report**

1. Sections 8A.3.2.2 and 8A.3.2.5 – the discussion of weighted-average input boundary layer parameters to AERMET is confusing in light of the fact of uniform land use surrounding the site. Discuss the surface parameters in light of the use of one sector.

   ***Response**: We updated our discussion to remove the reference “weighted-average” input and formulated the discussion around the uniform use to desert shrubland for the entire application area.*

2. Section 8A.3.2.3 Provide a justification for the use of hourly meteorological observations (i.e. cloud cover) from St. George, Utah and why they are deemed representative of conditions at the application site. A comparison of long-term climate data (monthly precipitation) and monitoring site geography (elevation, surrounding land forms, vegetation) would be appropriate. It may be that other surface stations are more representative of the application site meteorology. I don't see the St. George data set or an input file calling it. Provide the St. George surface data files. This data is not on the CD.

   ***Response**: See the response to this comment under item 1 of “Class II Protocol Comments”.*

3. Explain why solar radiation values in the single digits occur during hours of darkness for many days. Should these be set to zero if there is an instrument problem?

***Response**:  We also noticed that some of the solar radiation values in the onsite meteorological data are greater than 0.0 $Wm^{-2}$ at night. Because this seemed to be occurring over a large portion of the data period, it was determined that setting the values to 0.0 $Wm^{-2}$ would be a tedious task that could potentially introduce an error associated with daily estimates of sunrise and sunset hours. Therefore, we conducted a sensitivity test to determine if having nighttime insolation values greater than zero would affect boundary parameters in the surface file. These tests are located in the modeling archive in the "Insolation Test Cases" folder. The tests confirmed that AERMET does not use nighttime solar radiation for calculating boundary parameters; therefore, the data was left unchanged to avoid a large manual editing process.*

4. The BAPC cannot determine if the file onsite_06.dat is the raw on-site data or if it has been manipulated?

   ***Response**: Raw on-site data is provided in modeling archive in "onsite met data" folder and the edited on-site data is provided in the "AERMET" folder, in "onsite_06_07.dat" file.*

5. Section 8A.3.2.4 Describe the data substitution procedures followed to fill in missing data. Identify any data subject to disqualification. BAPC will need to review the graphical plots used to identify the disqualified data. See also comments on Sections 3.2.3 of the Class II protocol given above.

   ***Response**: Missing on-site data was not filled. See the response to this comment under item 2 of "Appendix A Comments".*

6. Justify changing the surface data variable bounds for wind speed, standard deviation of the horizontal wind direction, and standard deviation of the w-component of wind speed. If this is done to accommodate the SODAR data, perhaps a separate stage 1 AERMET run could be performed to aid evaluation of the tower data separately from the SODAR data. Also explain why the upper and lower bounds are not included in sky cover.

   ***Response**: In the stage 1 AERMET input file, we specified reasonable lower and upper bounds for each measured parameter to minimize the number of warning messages written to the AERMET error file. The upper limits for wind speed, sigma theta and sigma w represent actual measurements, especially at the 500-m level.*

   *We included the upper and lower bounds for sky cover.*

7. Section 8A.3.2.5 Correct error in Table 8A-4. See comments on Section 3.2.4 of the Class II protocol.

   ***Response**: We corrected the Bowen ratio value for summer, wet conditions to 1.5.*

8. Section 8A.3.5.1 See comment on Section 3.5.1 of the Class II protocol.

   ***Response**: No response required.*

9. Section 8A.4 Include a discussion of how emissions from units that operate only a portion of the year were addressed in the modeling. Include in the discussion reference to Tables 8A-11, 8A-12, and 8A-13. Why does the 3-hr $SO_2$ input file have emission rates higher than those described as the maximum emission

rates in the text and as listed in Table 8A-9? How are emissions for short term (1-hr, 3-hr, 8-hr, and 24-hr) averaging periods determined and what do they represent? BAPC requires that maximum hourly emission rates be utilized for these averaging periods.

***Response**: The emissions listed in Table 8A-9 are representative of maximum annual project emissions for informational purposes. Please note that Appendix 5 of the PSD application contains detailed emission calculations for all the modeled sources. Modeled emissions were based on the following formulation:*

- *For all CO modeling, maximum hourly emissions from each source were modeled to assess impacts for both the 1-hour and 8-hour averaging periods.*
- *For all $NO_X$ modeling, annual average emissions were used to assess impacts for the annual averaging period.*
- *For short-term (3-hour and 24-hour) $SO_2$ modeling, impacts were assessed by using the averaging period specific emission rate for the main boiler and maximum hourly emissions from the additional ancillary equipment.*
- *For annual $SO_2$ modeling, impacts were assessed by using annual average emissions from the main boiler and the ancillary equipment.*
- *For short-term and annual $PM_{10}$ modeling, impacts for both averaging periods were assessed using the maximum hourly emission rates for all sources due to the long run duration.*

10. Section 8A.5.1 Toquop Energy Project is located in HA 222 not 61 Lower. The adjacent basins are 205, 220, 221, 223, and 224, not HA 51, 61 Upper, or 71.

    ***Response**: These specifications have been corrected in the updated PSD Class II modeling report.*

11. Add a discussion regarding peak project impacts occurring west of the facility. This should complement the discussion of the impacts to the NNE. Do these impacts occur in the refined hill top receptors?

    ***Response**: We added this discussion in the final PSD Class II modeling report.*

12. Section 8A.5.3.1 Provide the electronic spreadsheet with a list of all sources for the cumulative modeling. Add the source identifier used in the modeling files to Tables 8A-27 through 8A-29. What is the significance of the bolded text in these tables?

    ***Response**: We included source identifier in the tables. There is no significance to the bolded sources. It is just a word processing artifact that was corrected (removed).*

13. Section 8A.5.4.5 Scheffe screening section 0.092 ppm is not less than 0.0125 ppm. Re-interpret this statement and/or correct this error. The Ozone Air Quality Standard is 0.125 ppm.

    ***Response**: We corrected the Ozone Air Quality Standard to be 0.125 ppm.*

**Class I Modeling Comments**

The Class I Modeling report was briefly reviewed; however, technical review is left to the Federal Land Managers.

> ***Response**: No response required. We will keep the department advised of our communications with the FLMs and invite participation in any conference calls that we plan. There was a conference call with the National Park Service on May 11, 2007 during which the NPS indicated general acceptance of the modeling procedures and results. The NPS also indicated that they need a draft permit and other supporting documents at least 60 days prior to a public hearing on the draft permit. Sithe Global will continue to provide permit application information in a timely manner to expedite the NDEP review so that this information can be provided to the NPS for their review.*

# ATTACHMENT 8A-3
# RESPONSES TO BAPC MODELING REVIEW – NOVEMBER 2007

**Responses to Nevada DEP Modeling Review for the Toquop Energy Project**
**Dated October 18, 2007**

**ENSR Corporation, on behalf of Sithe Global**
**November 5, 2007**

The Nevada Division of Environmental Protection – Bureau of Air Pollution Control (NDEP BAPC) reviewed the Class II modeling submittal provided by Toquop Energy, LLC (Toquop) in July 2007, and provided comments dated October 18, 2007. As stated by the NDEP, this review provided comments to the modeling protocol and report sections of the operating permit to construct application for Toquop.

The comments are reproduced below, along with our responses in italics. The updated PSD Class II modeling submittal (provided in Appendix 8A in early November 2007) incorporates our responses to these comments in the procedures used.

We have numbered the NDEP comments for better ease of reference. Please see numbered NDEP comments and preliminary ENSR responses below.

**NDEP Comment #1:**

Appendix 12-B Air Dispersion Modeling Protocol (Revised) – Class II Area Impacts (Protocol) is dated February 2007 and includes Appendix A, Responses to NDEP Comments on the Toquop Class II Modeling Protocol. The Protocol was not modified except by the addition of Appendix A. Appendix A of the Protocol responds to comments submitted by NDEP in a letter to Bruce MacDonald, ENSR, dated January 26, 2007. However, the Protocol does not address comments submitted by NDEP in a letter to Dirk Straussfeld, Toquop Energy, LLC, dated April 6, 2007. A response (Responses to Nevada DEP Modeling Review for the Toquop Energy Project, dated April 6, 2007) to the April NDEP letter was emailed to NDEP by Bob Paine, ENSR, on May 3, 2007. A modified version of these responses, dated July 9, 2007, is included in Appendix 8 as Attachment 8A-2 Responses to BAPC Modeling Review. Given the significance of this project and the public scrutiny expected, NDEP requests the Protocol be modified to incorporate the proposed changes into the Protocol text (i.e. not as appendices to the application) and the Protocol be submitted for formal approval as a stand-alone document. Although not required specifically, a formal approval of the Protocol would round out the record.

*ENSR response:*
*ENSR has provided an updated modeling protocol that reflects the most up-to-date modeling procedures.*

**NDEP Comment #2:**

<u>Appendix 8A Class II Modeling Report</u>

8A.3.2.3 Available Meteorological Data for AERMOD

It's not clear how the cloud cover data were incorporated into the meteorological data processing. The AerMet input file only calls the on-site met data and Desert Rock upper air data files. Were these data blended into the on-site met file?

The explanation and rational used to justify the use of St George cloud cover data provides NDEP with the clarification needed to support the use of these data. However, the report mis-states annual average rainfall at St George, which is in excess of 8 inches, while annual average rainfall at Overton, chosen as representative of precipitation at the facility, is approximately 4½ inches. NDEP recommends use of a southern Nevada site for cloud cover data more representative of the application site, a conclusion supported by the figures included in Justification for Selecting St George, Arizona, for Toquop Site Cloud Cover Data of Attachment 8A-1 of the Class II Modeling Report.

***ENSR Response:***
*The hourly cloud cover data was directly included in the on-site data file as opposed to using an external NWS file in AERMET. The revised modeling will provide the cloud cover in a separate input file, as requested by the NDEP.*

*ENSR agrees that there is a typographical error in the statement of the annual average precipitation data for St. George (8 inches as opposed 6 inches). However, as we discussed on our conference call of October 23, 2007, we jointly agree that St. George is more representative of cloud cover for the Toquop site than a southern Nevada site (for example, Las Vegas, which is probably the next most representative and reliable source). We refer to climatological maps in our updated Appendix 8A report. Overton was agreed upon for precipitation by NDEP because all parties agreed it was the closest and most representative of the project site. If cloud cover was available for Overton it would have been selected given the data capture was sufficient. However Overton is just a COOP site and does not measure cloud cover. Therefore, St. George was selected as the next best alternative.*

**NDEP Comment #3:**

Table 8A-7 Monthly Input Boundary Layer Parameters has numerous errors. Please submit a corrected version including a new column identifying whether the month was wet, dry, or average.

***ENSR Response:***
*ENSR notes that while the report table needs to be corrected, the modeling files are not affected. The requested column is included in the revised Appendix 8A document.*

**NDEP Comment #4:**

Table 8A-8 Highest Monitored Background Concentrations has long-term concentrations listed as annual, while they represent a 13-month period. Recalculate the long-term concentrations on an annual basis to represent the maximum annual concentration within the 13-month data collection period.

***ENSR Response:***
*ENSR discussed this issue with the NDEP during a conference call on October 23, 2007. We agreed that ENSR should select a contiguous 365-day period after reviewing the available on-site meteorological data capture. Our review of the data indicates that the period of April 20, 2006 through April 19, 2007 has data capture that is equivalent to or better than other choices of a 365-day period, so it was selected for annual average modeling.*

*In addition ENSR has revised the annual ambient background concentrations listed in Table 8A-8 to reflect a single 12-month annual average as opposed to a 13-month average.*

**NDEP Comment #5:**

8A.4 Characterization of Emissions for Modeling

This section states "annual emissions as modeled conservatively assume a 100 percent capacity factor with short-term emission rates, including $SO_2$." However, input files for $SO_2$ indicate variable $SO_2$ main boiler emissions depending on the averaging period. NDEP cannot reconcile how the main boiler emission rates are greater than the hourly rate at 100 percent load as shown on Table 8A-11 and the model input files. Sithe/Toquop needs to explain the apparent discrepancy or re-run the model.

In addition, the statement quoted above conflicts directly with the statement later in this section "For the combustion sources, maximum hourly emission rates were used to assess modeled impacts for short-term averaging periods (24-hours or less) while the annual utilization of the unit was factored into the emission rate for modeled impacts on an annual average basis." NDEP needs clarification as to whether the later statement only applies to those units operated intermittently through the year. If this is the case, Sithe/Toquop needs to clarify the text to reflect this situation. A table of all sources showing the emission rates used for short-term versus long-term averaging periods would be helpful.

***ENSR Response:***
*ENSR has discussed this issue with the NDEP. There are different $SO_2$ emission rates for the main boiler for 3-hour, 24-hour, and annual average that are being separately modeled and which will become permit conditions. This will be more clearly explained in the revised Appendix 8A document.*

*In addition, some sources operate only a few hours a day. ENSR has agreed to model these at maximum hourly emissions only during the hours of the day that these sources are likely to operate. As explained in the revised Appendix 8A, ENSR has selected, when appropriate for some sources, operating hours during the day that are likely to have the most restrictive dispersion conditions.*

**NDEP Comment #6:**

Tables 8A-10 and -11

Table 8A-10 lists the $NO_X$ and $SO_2$ emissions in tons per year and the numbers are not equal, however Table 8A-11 lists the same hourly emission rates. Sithe/Toquop needs to explain how the higher, short term $SO_2$ number was derived and to further clarify and identify the implementation of modeling emission rates differing from PSD emission rates.

***ENSR Response:***
*Our response to NDEP Comment #5 also applies to this comment. In addition, it should be noted that the hourly emission rates listed for $SO_2$ and $NO_X$ are for the 24-hour average only, and the $SO_2$ emission rate for the main stack varies by averaging time, while this is not the case for $NO_X$ emissions.*

**NDEP Comment #7:**

Tables 8A-12 through -16

NDEP requires modeling for short-term averaging periods of fugitive particulate sources to use the hourly emission rates, not daily average emission rates. The conservative modeling approach using hourly emission rates identifies potential exceedences of short-term averaging period NAAQS, especially 3-hour and 24-hour averages for $SO_2$. Provide a list of those sources which were modeled using the daily average emission rates and tabulate the hourly emission rates for comparison. NDEP may require additional model runs with hourly emission rates upon evaluation of the requested data.

***ENSR Response:***
*This issue was addressed in the response to NDEP Comment #5.*

**NDEP Comment #8:**

8A.5.1 PSD Class II Significant Impact Analysis

It is NDEP's understanding that Sithe/Toquop has conducted these modeling runs with a full year of on-site data. The text needs to be modified to indicate that this is the case.

***ENSR Response:***
*NDEP's understanding is correct. ENSR will clarify the discussion in a revised Appendix 8A.*

**NDEP Comment #9:**

Figures 8A-11 AerMod Receptor Grid and -14 Location of Maximum Project Impacts

Visual inspection of the hill receptor grid suggests that the maximum 3-hour $SO_2$ impact occurs in an area of incomplete refined grid coverage. Include a figure showing the maximum impacts in relationship to the receptor grids. Upon review of the requested information, NDEP may request additional model runs with a refined grid in the areas of maximum impacts.

***ENSR Response:***
*ENSR will overlay the receptor grid onto Figure 8A-14. If the 3-hour $SO_2$ impacts fall outside of the refined receptors on the hill, a refined receptor grid can be used in additional model runs as suggested by the NDEP. However, it turns out, as discussed in Appendix 8A, that additional model runs are not necessary.*

**NDEP Comment #10:**

8A.5.3 Assessment of Compliance with NAAQS and PSD Increments

Identify those receptors where total impacts exceed 75 percent of a NAAQS or PSD Increment. NDEP also requests figures showing these locations and the resulting refined grid. If no receptors have these impacts, delete the appropriate portions of the text.

***ENSR Response:***
*As shown in the results tables in the revised Appendix 8A, all NAAQS and PSD increment results are less than 75 percent of their respective standards. Therefore ENSR will remove the statement about additional refined receptors.*

**NDEP Comment #11:**

8A.5.3.1 Background Source Inventory

Sithe/Toquop needs to clarify what is meant by a source greater than the SIA plus 50 km.

***ENSR Response:***
*To clarify, this means that if a candidate source's distance from the project site is greater than the calculated SIA plus 50 km, then it will not be considered in the cumulative modeling assessment. The revised Appendix 8A document includes this clarification.*

**NDEP Comment #12:**

Sithe/Toquop needs to document how both short-term and long-term emission rates are represented in the background source inventory. Short-term emission rates should be used as appropriate for NAAQS and PSD Increment modeling.

***ENSR Response:***
*We have used short-term PTE emission rates (as provided by Clark County DAQEM and NDEP) of background sources for short-term and long-term (> 24-hours) PTE rates for long-term modeling. This is mentioned in the revised Appendix 8A document.*

**NDEP Comment #13:**

Sithe/Toquop needs to prepare a figure showing the SIA plus 50 km and the background sources included in the NAAQS and PSD Increment modeling.

The referenced spreadsheet states "include all sources within 56 km of the proposed site for $SO_2$" and "include all sources with 52 km of the proposed site". The SIA for $SO_2$ is 8 km and for $PM_{10}$ is 3 km. Sithe/Toquop needs to ensure all sources within 50 km plus the SIA are included in the background emission inventory and correct the spreadsheets.

***ENSR Response:***
*We have added the requested figure in the revised Appendix 8A report. The list of background sources included in the cumulative modeling is clearly documented in this report and in the spreadsheets provided in the computer modeling archive.*

**NDEP Comment #14:**

The origin for the calculated receptor distances needs to be documented.

***ENSR Response:***
*This issue is clarified in the revised Appendix 8A report; the distances are calculated relative to the location of the Toquop main boiler stack.*

**ATTACHMENT 8A-4**
**AIR QUALITY PERMIT FOR**
**PRECISION AGGREGATE PRODUCTS, LLC**

# Department of Air Quality & Environmental Management

500 S Grand Central Parkway 1st Fl • Box 555210 • Las Vegas NV 89155-5210
(702) 455-5942 • Fax (702) 383-9994

Lewis Wallenmeyer, Director • Alan Pinkerton, Deputy Director


# AUTHORITY TO CONSTRUCT/OPERATING PERMIT FOR A NONMAJOR AGGREGATE PROCESSING PLANT, WASH PLANT, AND READY-MIX CONCRETE BATCH PLANT

**Source:** 15694
**Modification:** 1
**Revision:** 0

| | |
|---|---|
| **Company Name:** | Precision Aggregate Products, LLC |
| | |
| **Source Name:** | Precision Aggregate Products, LLC |
| | |
| **Source Address:** | BLM Community Pit near Mesquite, Nevada |
| | |
| **Airshed Name:** | Virgin Valley |
| **Hydrographic Area:** | 222 |
| **Township, Range, Section:** | T 13S, R 71E, Section 20 |
| | |
| **Address (Mailing/Billing):** | P.O. Box 2458 |
| | Mesquite, Nevada 89027 |
| | |
| | |
| **Telephone Numbers:** | (702) 346-1343 |
| | (702) 346-5825 / Fax |
| | |
| **SIC Code:** | 1442: Construction Sand and Gravel<br>3273: Ready-Mix Concrete Manufacturing |
| **NAICS Code:** | 212321: Construction Sand and Gravel<br>327320: Ready-Mix Concrete Manufacturing |
| | |
| **Description:** | Modification 1 to existing ATC/OP – addition of three conveyors and grammatical correction. |
| | |
| **Issuance Date:** | **August 13, 2007** |

Table of Contents

## I ACRONYMS

| Acronym | Term |
|---|---|
| AQR | Clark County Air Quality Regulations |
| ATC | Authority to Construct Certificate or Authority to Construct |
| ATC/OP | Authority to Construct/Operating Permit |
| CE | Control Efficiency |
| CEM | Continuous Emissions Monitoring System |
| CF | Control Factor |
| CFR | United States Code of Federal Regulations |
| CO | Carbon Monoxide |
| CPI | Urban Consumer Price Index |
| DAQEM | Clark County Department of Air Quality & Environmental Management |
| EF | Emission Factor |
| EU | Emission Unit |
| HP | Horse Power |
| kW | kiloWatt |
| MMBtu | Millions of British Thermal Units |
| NAICS | North American Industry Classification System |
| NEI | Net Emission Increase |
| $NO_X$ | Nitrogen Oxides |
| NSPS | New Source Performance Standards |
| NSR | New Source Review |
| OP | Operating Permit |
| $PM_{10}$ | Particulate Matter less than 10 microns |
| ppm | Parts per Million |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential to Emit |
| SCC | Source Classification Codes |
| SIC | Standard Industrial Classification |
| SIP | State Implementation Plan |
| $SO_X$ | Sulfur Oxides |
| TSD | Technical Support Document |
| VOC | Volatile Organic Compound |

## II ADMINISTRATIVE

1. Pursuant to the AQR, the Control Officer issues this ATC/OP with conditions to: Precision Aggregate Products LLC, located at the BLM Community Pit near Mesquite, Nevada.
2. This permit modifies, consolidates, supersedes, and replaces any ATC/OP certificates previously issued for this source from the date of issuance of this permit forward.
3. This ATC/OP, or a copy thereof, shall be kept on-site.
4. This ATC/OP does not replace, supersede, or circumvent permitting requirements of any other regulatory agency. This ATC/OP and the requirements herein are based upon the Clark County regulations in place at the time of issuance. To the extent that there may be differences in the requirements of Clark County's regulations in place at the time of permit issuance and the federally-enforceable SIP requirements, DAQEM has attempted to ensure that this ATC/OP satisfies both sets of requirements.
5. Pursuant to AQR Section 4, the Control Officer or his representative may enter into the property, with or without prior notice, at any reasonable time, for the purpose of establishing compliance with the AQR or this permit.
6. The conditions of this permit are severable. If any condition is found to be invalid, then such invalidity shall not affect any other conditions that can be given effect without the invalid condition(s).
7. Pursuant to AQR Sections 12 and 55, any physical change, or any change in operation, which causes, or has the potential to cause a net emissions increase shall obtain an ATC prior to such change.
8. Any increase in a throughput rate or production rate or emission limit in this ATC/OP may require a new performance test.
9. No emission unit , other than those listed in the summary of emission units of this ATC/OP, shall be installed, modified, or operated without an approved ATC issued by the DAQEM.
10. Any changes in control or ownership of the source shall require a transfer of the ATC/OP by the owner/operator to the new owner/operator upon approval by the Control Officer and payment of the required fees.
11. The previous owner/operator shall provide to the new owner/operator all records required to be kept pursuant to this ATC/OP.
12. A partial calendar year annual report and annual actual emissions report shall be sent to DAQEM by the previous owner prior to, or in conjunction with, requesting the transfer of control or ownership. Previous owner/operator shall be primarily liable for fees and obligations incurred prior to the request for transfer of ownership. The new owner/operator may be liable for fees and obligations incurred by the previous owner prior to the transfer of ownership if the previous owner/operator fails to remit. The new owner/operator shall be liable for fees and obligations after the transfer of ownership.
13. If the owner/operator closes the business or an individual source, then a final annual report and annual actual emissions report shall be sent to DAQEM not less than 30

days prior to closure in addition to requesting that the permit be archived. Owner/operator shall be held liable for fees and obligations incurred prior to the request to archive.

14. Pursuant to AQR Section 43, this source shall be operated in a manner such that odors will not cause a nuisance.
15. Violation of any conditions of this ATC/OP may subject the owner/operator to enforcement action that may include, but is not limited to, a CAO, NOV, Compliance Schedule, Stop Order, or federal enforcement action.
16. The Control Officer reserves the right, upon reasonable cause, to modify existing conditions and impose additional new compliance, monitoring and control requirements.

# III EMISSION UNITS

## A LIST OF EMISSION UNITS

### TABLE III-A-1: Emission Unit List

| EU | Description | SCC | Throughput | | | $PM_{10}$ EF[3] (lbs/ton) | Moisture Control[2] | PTE $PM_{10}$ | | | Type[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tons/ hour | tons/ day | tons/ year | | | lbs/ hr | lbs/ day | tons/ year | |
| A01 | Mining and Excavation | 30502513 | 250 | 2,500 | 350,000 | 0.08 | 0.047 | 0.94 | 9.40 | 0.66 | P1 |
| A02 | Loader to Grizzly Feeder[4] | 30502505 | 250 | 2,500 | 350,000 | (Included in A01) | | --- | --- | --- | DM |
| A03 | Grizzly Feeder to Conveyor 1 | 30502503 | 250 | 2,500 | 350,000 | 0.01 | 0.047 | 0.12 | 1.18 | 0.08 | P1 |
| A03a[5] | Conveyor 1 to Conveyor 1a | 30502503 | 250 | 2,500 | 350,000 | 0.01 | 0.047 | 0.12 | 1.18 | 0.08 | DM |
| A04 | Conveyor 1a to Scalping Screen | 30502503 | 250 | 2,500 | 350,000 | (Included in A05) | | --- | --- | --- | DM |
| A05 | Scalping Screen | 30502511 | 250 | 2,500 | 350,000 | 0.08 | 0.047 | 0.94 | 9.40 | 0.66 | P1 |
| A06 | Scalping Screen to Conveyor 2 | 30502503 | 88 | 880 | 123,200 | (Included in A05) | | --- | --- | --- | DM |
| A07 | Conveyor 2 to Impact Crusher | 30502503 | 88 | 880 | 123,200 | (Included in A08) | | --- | --- | --- | DM |
| A08 | Impact Crusher | 30502510 | 100 | 1,000 | 140,000 | 0.13 | 0.047 | 0.61 | 6.11 | 0.43 | P1 |
| A09 | Impact Crusher to Conveyor 3 | 30502503 | 100 | 1,000 | 140,000 | (Included in A08) | | --- | --- | --- | DM |
| A10 | Conveyor 3 to Conveyor 4 | 30502503 | 100 | 1,000 | 140,000 | 0.01 | 0.047 | 0.05 | 0.47 | 0.03 | DM |
| A11 | Scalping Screen to Conveyor 4 | 30502503 | 150 | 1,500 | 210,000 | (Included in A05) | | --- | --- | --- | DM |
| A12 | Conveyor 4 to Deck Screen | 30502503 | 250 | 2,500 | 350,000 | (Included in A13) | | --- | --- | --- | DM |
| A13 | Deck Screen | 30502511 | 338 | 3,380 | 473,200 | 0.08 | 0.047 | 1.27 | 12.71 | 0.89 | P1 |
| A14 | Deck Screen to Conveyor 6 | 30500503 | 12 | 120 | 16,800 | (Included in A13) | | --- | --- | --- | DM |
| A15 | Conveyor 6 to Impact Crusher | 30502503 | 12 | 120 | 16,800 | (Included in A08) | | --- | --- | --- | DM |
| A16 | Deck Screen to Cone Crusher | 30502503 | 88 | 880 | 123,200 | (Included in A17) | | --- | --- | --- | DM |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A17 | Cone Crusher | 30502510 | 88 | 880 | 123,200 | 0.13 | 0.047 | 0.54 | 5.38 | 0.38 | P1 |
| A18 | Cone Crusher to Conveyor 5a | 30502503 | 88 | 880 | 123,200 | (Included in A17) | | --- | --- | --- | DM |
| A18a[5] | Conveyor 5a to Conveyor 5 | 30502503 | 88 | 880 | 123,200 | 0.01 | 0.047 | 0.04 | 0.41 | 0.03 | DM |
| A19 | Conveyor 5 to Deck Screen | 30502503 | 88 | 880 | 123,200 | (Included in A13) | | --- | --- | --- | DM |
| A20 | Deck Screen to Conveyor 7 | 30502503 | 238 | 2,380 | 333,200 | (Included in A13) | | --- | --- | --- | DM |
| A20a[5] | Conveyor 7 to Radial Stacker 1 | 30502503 | 238 | 2,380 | 333,200 | 0.01 | 0.047 | 0.11 | 1.12 | 0.08 | DM |
| A21 | Radial Stacker 1 to Stockpile | 30502505 | 238 | 2,380 | 333,200 | 0.04 | 0.047 | 0.45 | 4.47 | 0.31 | P1 |
| A22 | Scalping Screen to Stacker 1 | 30502503 | 12 | 120 | 16,800 | (Included in A05) | | --- | --- | --- | DM |
| A23 | Stacker 1 to Reject Stockpile | 30502505 | 12 | 120 | 16,800 | 0.04 | 0.047 | 0.02 | 0.23 | 0.02 | P1 |
| A24 | Disturbed Surface / Stockpiles | 30502507 | 2 acres | | | 1.66 lbs/acre-day | | 0.14 | 3.32 | 0.61 | S1 |
| **$PM_{10}$ Subtotal** | | | | | | | | **5.35** | **55.38** | **4.26** | |
| D01 | CAT Diesel Generator | 20200102 | 54.5 gallons per hour<br>10 hours per day<br>1,400 hours per year | | | | EF (lbs/gal) | PTE (lbs/hr) | PTE (lbs/day) | PTE (tons/yr) | CE2 |
| | | | $PM_{10}$ | | | | 0.03350 | 1.83 | 18.26 | 1.28 | |
| | | | $NO_x$ | | | | 0.46900 | 25.56 | 255.61 | 17.89 | |
| | | | CO | | | | 0.10200 | 5.56 | 55.59 | 3.89 | |
| | | | $SO_x$ | | | | 0.00710 | 0.39 | 3.87 | 0.27 | |
| | | | VOC | | | | 0.03750 | 2.04 | 20.44 | 1.43 | |
| | | | Total HAP | | | | 0.00959 | 0.52 | 5.23 | 0.37 | |
| **$PM_{10}$ Total** | | | | | | | | **7.18** | **73.64** | **5.54** | |

Based on 350,000 tons of production per year in dry material and 1,400 hours of operation per year of diesel fuel usage.
[1]Type is a designation for emission unit billing purposes: DM=deminimus, P1=process equipment, S1=disturbed surface, CE2=stationary IC engine 351-800 hp. Fees are listed in AQR Section 18.
[2]A Control Factor of 0.047 is equivalent to 4.0 percent moisture in 0.25-inch minus materials.
[3]DAQEM or AP-42 default emission factors are used throughout.
[4]Aggregate loading through ground hopper.
[5]New emission unit as a result of Modification 1 to the ATC/OP.

## TABLE III-A-2: Emission Unit List

| EU | Description | SCC | Throughput | | | $PM_{10}$ EF[3] (lbs/ton) | Moisture Control[2] | PTE $PM_{10}$ | | | Type[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tons/ hour | tons/ day | tons/ year | | | lbs/ hr | lbs/ day | tons/ year | |
| B01 | Loader to Feed Hopper | 30502505 | 100 | 1,000 | 200,000 | 0.04 | 0.047 | 0.19 | 1.90 | 0.19 | P1 |
| B02 | Feed Hopper to Conveyor 7 | 30502503 | 100 | 1,000 | 200,000 | (Emissions included in B01) | | | | | DM |
| B03 | Conveyor 7 to Wet Screen | 30502503 | 100 | 1,000 | 200,000 | 0.01 | 0.047 | 0.05 | 0.50 | 0.05 | P1 |
| B04 | Wet Screen | 30502511 | 100 | 1,000 | 200,000 | (Wet Process – No Emissions) | | | | | DM |
| B05 | Wet Screen to Stacker 2 | 30502503 | 5 | 50 | 10,000 | (Wet Process – No Emissions) | | | | | DM |
| B06 | Stacker 2 to Stockpile | 30502505 | 5 | 50 | 10,000 | (Wet Process – No Emissions) | | | | | DM |
| B07 | Wet Screen to Stacker 3 | 30502503 | 55 | 550 | 110,000 | (Wet Process – No Emissions) | | | | | DM |
| B08 | Stacker 3 to Stockpile | 30502505 | 55 | 550 | 110,000 | (Wet Process – No Emissions) | | | | | DM |
| B09 | Wet Screen to Sand Screw | 30502503 | 40 | 400 | 80,000 | (Wet Process – No Emissions) | | | | | DM |
| B10 | Sand Screw to Stacker 4 | 30502503 | 40 | 400 | 80,000 | (Wet Process – No Emissions) | | | | | DM |
| B11 | Stacker 4 to Stockpile | 30502505 | 40 | 400 | 80,000 | (Wet Process – No Emissions) | | | | | DM |
| **$PM_{10}$ Subtotal** | | | | | | | | **0.24** | **2.40** | **0.24** | |
| D02 | Olympian Diesel Electric Generator (167 hp, 124 kW) S/N: HX125P1 | 20200102 | 12.0 gallons per hour<br>10 hours per day<br>1,400 hours per year | | | | EF (lbs/gal) | PTE (lbs/hr) | PTE (lbs/day) | PTE (tons/yr) | CE1 |
| | | | $PM_{10}$ | | | | 0.03350 | 0.40 | 4.02 | 0.28 | |
| | | | $NO_x$ | | | | 0.46900 | 5.63 | 56.28 | 3.94 | |
| | | | CO | | | | 0.10200 | 1.22 | 12.24 | 0.86 | |
| | | | $SO_x$ | | | | 0.00710 | 0.09 | 0.85 | 0.06 | |
| | | | VOC | | | | 0.03750 | 0.45 | 4.50 | 0.32 | |
| | | | Total HAP | | | | 0.00959 | 0.12 | 1.15 | 0.08 | |
| **$PM_{10}$ Total** | | | | | | | | **0.64** | **6.42** | **0.52** | |

Based on 200,000 tons of production per year in dry material and 1,400 hours of operation per year of diesel fuel usage.
[1]Type is a designation for emission unit billing purposes: DM=deminimus, P1=process equipment, CE1stationary IC engine 35 – 350 hp. Fees are listed in AQR Section 18.
[2]A Control Factor of 0.047 is equivalent to 4.0 percent moisture in 0.25-inch minus materials.
[3]DAQEM or AP-42 default emission factors are used throughout.

## TABLE III-A-3: Emission Unit List

| EU | Description | SCC | Throughput | | | $PM_{10}$ EF[3] (lbs/ton) | Moisture Control[2] | PTE $PM_{10}$ | | | Type[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tons/ hour | tons/ day | tons/ year | | | lbs/ hr | lbs/ day | tons/ year | |
| C01 | Loader to Feed Hopper | 30502505 | 237 | 2,370 | 100,000 | 0.04 | 0.034 | 0.32 | 3.20 | 0.07 | P1 |
| C02 | Feed Hopper to Conveyor 1 | 30502503 | 237 | 2,370 | 100,000 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C03 | Conveyor 1 to 4 Bin Compartment | 30502505 | 237 | 2,370 | 100,000 | 0.01 | 0.034 | 0.08 | 0.80 | 0.02 | P1 |
| C04 | 4 Bin Compartment to Weigh Hopper | 30502503 | 237 | 2,370 | 100,000 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C05 | Weigh Hopper to Conveyor 2 | 30502503 | 237 | 2,370 | 100,000 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C06 | Conveyor 2 to Conveyor 3 | 30502503 | 237 | 2,370 | 100,000 | 0.01 | 0.034 | 0.08 | 0.80 | 0.02 | DM |
| C07 | Cement Silo Loading[4] | 30501107 | 33 | 330 | 13,924 | 0.00034 | 1.0 | 0.01 | 0.10 | 0.01 | S2 |
| C08 | Fly Ash Loading[4] | 30501107 | 12 | 120 | 5,063 | 0.0049 | 1.0 | 0.06 | 0.60 | 0.01 | S2 |
| C09 | Cement Silo to Weigh Batcher | 30502503 | 33 | 330 | 13,924 | 0.0024 | 1.0 | 0.08 | 0.80 | 0.02 | DM |
| C10 | Fly Ash Silo to Screw Conveyor 1 | 30502503 | 12 | 120 | 5,063 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C11 | Screw Conveyor to Weigh Batcher | 30501199 | 12 | 120 | 5,063 | 0.0024 | 1.0 | 0.03 | 0.30 | 0.02 | DM |
| C12 | Weigh Batcher | 30501114 | 45 | 450 | 18,987 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C13 | Weigh Batcher to Screw Conveyor 2 | 30502503 | 45 | 450 | 18,987 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C14 | Screw Conveyor 2 to Loadout | 30502503 | 45 | 450 | 18,987 | (Enclosed Emission Point) | | --- | --- | --- | DM |
| C15 | Conveyor 3 to Loadout | 30502503 | 237 | 2,370 | 100,000 | 0.01 | 0.034 | 0.08 | 0.80 | 0.01 | DM |
| C16 | Loadout | 30501110 | 45 | 450 | 18,987 | 0.15 | 1.0 | 6.75 | 67.50 | 1.42 | P1 |
| C17 | Aggregate Haul Out, unpaved (1.0 miles RT) | 30502504 | 2.2 VMT/hr | | 7.57 lbs/VMT | | 0.10 | 1.67 | 16.70 | 2.10 | H1 |
| C18 | Concrete Haul Out, unpaved (1.0 miles RT) | 30502504 | 15.0 VMT/hr | | 7.57 lbs/VMT | | 0.10 | 11.36 | 113.6 | 1.89 | H1 |

| EU | Description | SCC | Throughput | | | $PM_{10}$ EF[3] (lbs/ton) | Moisture Control[2] | PTE $PM_{10}$ | | | Type[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | tons/ hour | tons/ day | tons/ year | | | lbs/ hr | lbs/ day | tons/ year | |
| **$PM_{10}$ Subtotal** | | | | | | | | **20.52** | **205.20** | **5.59** | |
| D03 | Olympian Diesel Electric Generator (167 hp, 124 kW) S/N: 4147 | 20200102 | 12.0 gallons per hour<br>10 hours per day<br>1,400 hours per year | | | | EF (lbs/gal) | PTE (lbs/hr) | PTE (lbs/day) | PTE (tons/yr) | CE1 |
| | | | $PM_{10}$ | | | | 0.03350 | 0.40 | 4.02 | 0.28 | |
| | | | $NO_x$ | | | | 0.46900 | 5.63 | 56.28 | 3.94 | |
| | | | CO | | | | 0.10200 | 1.22 | 12.24 | 0.86 | |
| | | | $SO_x$ | | | | 0.00710 | 0.09 | 0.85 | 0.06 | |
| | | | VOC | | | | 0.03750 | 0.45 | 4.50 | 0.32 | |
| | | | Total HAP | | | | 0.00959 | 0.12 | 1.15 | 0.08 | |
| **$PM_{10}$ Total** | | | | | | | | **20.92** | **209.22** | **5.87** | |

Based on 100,000 tons of production per year in dry material and 1,400 hours of operation per year of diesel fuel usage.
[1]Type is a designation for emission unit billing purposes: DM=deminimus, P1=process equipment, H1=haul road, S2=storage silo, CE1 stationary IC engine 31 – 350 hp. Fees are listed in AQR Section 18.
[2]A Control Factor of 0.034 is equivalent to 5.0 percent moisture in 0.25-inch minus materials.
[3]DAQEM or AP-42 default emission factors are used throughout.
[4]Emissions controlled by associated binvent.

## B EMISSION LIMITATIONS

Neither the actual nor the allowable emissions shall exceed the calculated PTE limits per emission unit as delineated in Section II A nor the aggregate plant limits tabulated in Tables III-B-1 through III-B-2.

**Table III-B-1. Total PTE for Source**

| Pollutant | $PM_{10}$ | $NO_x$ | CO | $SO_x$ | VOC | Total HAP |
|---|---|---|---|---|---|---|
| **lbs/hour** | 28.74 | 36.82 | 8.00 | 0.57 | 2.94 | 0.76 |
| **lbs/day** | 289.28 | 368.17 | 80.07 | 5.57 | 29.44 | 7.53 |
| **tons/year** | 11.93 | 25.77 | 5.61 | 0.39 | 2.07 | 0.53 |

**Table III-B-2. Source PTE of $PM_{10}$ by process**

| Operation | Lbs/Hour | Lbs/Day | Tons/Year |
|---|---|---|---|
| Mining | 0.94 | 9.40 | 0.66 |
| Processing | 12.00 | 119.96 | 4.83 |
| Disturbed Areas / Stockpiles 2 Acres | 0.14 | 3.32 | 0.61 |
| Haul (aggregate) | 1.67 | 16.70 | 2.10 |
| Haul (concrete) | 11.36 | 113.6 | 1.89 |
| Engine (CAT) | 1.83 | 18.26 | 1.28 |
| Engine (Olympian) | 0.40 | 4.02 | 0.28 |
| Engine (Olympian) | 0.40 | 4.02 | 0.28 |
| **Total** | **28.74** | **289.28** | **11.93** |

## IV CONDITIONS

## A PRODUCTION LIMITATIONS

1. The production shall not exceed the throughput limits per emission unit as delineated in Table III -A-1, Table III-A-2, Table III-A-3, nor the source limits in this section.
2. Production of aggregate processing products at this facility shall be limited up to 250.0 tons per hour, up to 2,500 tons per day, and up to 350,000 per day.
3. Production of aggregate wash products at this facility shall be limited up to 100.0 tons per hour, 1,000 tons per day, and up to 200,000 tons per year.
4. Production of concrete products at this facility shall be limited up to 237.0 tons per hour, 2,370 tons per day, and up to 100,000 tons per year
5. Operation of the three diesel engines (EUs: D01 through D03) shall not exceed the limitations presented in Table IV-A-1.

**TABLE IV-A-1: Maximum Allowable Diesel Engine Usage**

| EU | Gallons/Hour | Hours/Day | Hours/Year |
|---|---|---|---|
| D01 CAT 730 hp, 544 kW | 54.5 | 10.0 | 1,400.0 |
| D02 Olympian 167 hp, 124 kW | 12.0 | 10.0 | 1,400.0 |
| D03 Olympian 167 hp, 124 kW | 12.0 | 10.0 | 1,400.0 |

## B CONTROL REQUIREMENTS

1. The owner/operator shall take continual measures to control fugitive dust (e.g. wet, chemical or organic suppression, enclosures, etc.) at all mining and aggregate processing operations, material transfer points, stockpiles, truck loading stations and haul roads throughout the source. The Control Officer may at any time require additional water sprays or other controls at pertinent locations if an inspection indicates that opacity limits are being exceeded.
2. The owner/operator shall not cause or allow fugitive dust to become airborne without taking reasonable precautions.
3. The owner/operator shall not cause or allow the discharge of fugitive dust in excess of 100.0 yards from the point of origin or beyond the lot line of the property on which the emissions originate, whichever is less.
4. On-site personnel shall regularly observe operations and investigate any occurrence of visible fugitive dust. Corrective action shall be immediately taken to correct causes of fugitive dust in excess of allowable opacity limits.
5. Paved roads accessing or located on the site shall be swept and/or rinsed as necessary to remove all observable deposits and so as not to exhibit an opacity greater than 20.0 percent for a period or periods totaling more than 3 minutes in any 60 minute period or an instantaneous opacity greater than 50.0 percent. In addition, silt loading shall not exceed 0.33 ounces/square foot regardless of the average number of vehicles per day.
6. Unpaved roads accessing or located on the site shall be treated with chemical or organic dust suppressant and watered as necessary, or paved, or graveled, or have an alternate, Control Officer approved, control measure applied, so as not to exhibit an opacity greater than 20.0 percent for a period or periods totaling more than 3 minutes in any 60 minute period or an instantaneous opacity greater than 50.0 percent. In addition, silt content shall not exceed 6.0 percent or silt loading shall not exceed 0.33 ounces/square foot (depending on the control method chosen) regardless of the average number of vehicles per day.
7. Mud or dirt shall not be allowed to be tracked out onto a paved road where such mud or dirt extends 50.0 feet or more in cumulative length from the point of origin or allow any trackout to accumulate to a depth greater than 0.25 inches. Notwithstanding the preceding, all accumulations of mud or dirt on curbs, gutters, sidewalks or paved roads including trackout less than 50.0 feet in length an 0.25 inches in depth, shall be cleaned of all observable deposits and maintained to eliminate emissions of fugitive dust.
8. The owner/operator shall ensure that all loaded trucks, regardless of ownership, shall be properly covered to prevent visible emissions.
9. Fugitive dust emissions from screens, conveyors and loading operations shall not exhibit an opacity greater than 10.0 percent for a period or periods totaling more than 3 minutes in any 60 minute period.
10. Fugitive dust emissions from crushers shall not exhibit an opacity greater than 15.0 percent for a period or periods totaling more than 3 minutes in any 60 minute period.

11. Fugitive dust emissions from screens, crushers, conveyors, storage piles, transfer points, and nonmetallic mineral processing equipment not connected to baghouse controls or part of the wet process shall be controlled by operational water sprays as needed to prevent exceeding opacity standards.
12. The binvents on EUs C07 and C08 shall not exhibit visible emissions greater than 7.0 percent opacity for a period or periods aggregating more than 3 minutes in any 60 minute period, the concentration shall be taken from the applicable requirement as specified in any Federal or local standard such as 40 CFR 60 Subpart I or UUU, OOO, AQR Section 26, 34.
13. The binvents on EUs C07 and C08 shall be used to control particulate emissions at all times the processing equipment is operating.
14. The binvents on EUs C07 and C08 shall have a particulate control efficiency of at least 99.0 percent.
15. An effective seal shall be required around the binvents and the pressure drop across each binvent shall be maintained within the limits specified by the manufacturer.
16. Daily visual observations of the binvents shall be made to verify that visible emissions are not present. If they are, the owner/operator shall cease operations producing the emissions until the problem is corrected.
17. Monthly visual inspection shall be made of the binvent for air leaks. Defective components shall be repaired or replaced within 5 working days of the discovery of the malfunction. Should the malfunction cause the binvent to be ineffective in controlling particulate emissions, the processing of material shall cease until such repairs to the binvent are completed.
18. A preventative maintenance schedule that is consistent with the binvent manufacturer's specifications for routine and long-term maintenance, shall be developed and followed.
19. A water spray system shall be maintained in good operating condition, as verified by a daily inspection, and be used at all times during the processing of the material. This shall include but not be limited to crushing, screening, transfer points, drop points and stacker points excluding washed product processing. The owner/operator shall investigate and correct any problems before resuming operations. The Control Officer at any time may require additional watersprays at pertinent locations if an inspection by the Control Officer indicates that the three minute opacity limit is being exceeded
20. The control method for mining and aggregates processing operations including all transfer points shall consist of maintaining a minimum of 4.0 percent moisture content in materials less than 0.25 inches in diameter for the entire process that shall maintain a 95.3 percent control on $PM_{10}$ emissions.
21. The control method for the aggregate wash plant operations for emission units B01 through B03 (inclusive) shall consist of maintaining a minimum of 4.0 percent moisture content in materials less than 0.25 inches in diameter for the process that shall maintain a 95.3 percent control on $PM_{10}$ emissions.
22. The control method for the concrete batch plant for emission units C01, C03, C06, and C15 shall consist of maintaining a minimum of 5.0 percent moisture content in materials less than 0.25 inches in diameter for the entire process that shall maintain a 96.6 percent control on $PM_{10}$ emissions.

23. The control method for the aggregate wash plant operations for EUs: B04 through B11 (inclusive), including all transfer points, shall consist of maintaining a minimum of 10.0 percent moisture content I materials less than 0.25 inches in diameter for the process that shall maintain a 100.0 percent control on $PM_{10}$ emissions.
24. The owner/operator shall not discharge from any source whatsoever quantities of air contaminants or other material which cause a nuisance.
25. Only low sulfur diesel fuel (0.05 percent or less sulfur by weight) may be used to fuel any diesel engine. All engines shall be turbocharged and aftercooled.
26. Fugitive dust emissions from any disturbed open area or disturbed vacant lot that are owned or operated by the owner/operator shall be controlled by paving, applying gravel, applying a dust palliative or applying water to form a crust.
27. Particulate matter emissions from any unpaved parking lot owned or operated by the owner/operator shall be controlled by paving, applying a dust palliative or by an alternate method approved by the Control Officer regardless of the number of days of use.
28. Where a stationary source, or a portion thereof, is to be closed or idled for a period of 30 days or more, long-term stabilization of disturbed areas shall be implemented within 10 days following the cessation of active operations. Long-term stabilization includes, but is not limited to one or more of the following: applying water to form a crust, applying palliatives, applying gravel, paving, denying unauthorized access or other effective control measure to prevent fugitive dust from becoming airborne.
29. The owner/operator must comply with control requirements contained in this section. If there is inconsistency between standards or requirements, the most stringent standard or requirement shall apply.
30. Failure to comply with conditions contained in this section may result in revocation of this ATC/OP.

## C MITIGATION

There are no federal offset requirements.

## D ON-SITE, AMBIENT AIR MONITORING

On-site, ambient air monitoring is not required by this ATC/OP.

## E COMPLIANCE DEMONSTRATION

1. This source is required to comply with the version of 40 CFR 60, Subpart OOO that is in AQR Section 14, as well as the current Federally-Approved version, whichever is more stringent.
2. Unless specified otherwise, compliance with the Subpart OOO and AQR Section 34 opacity standards specified in Section IV-B of this document shall be demonstrated in accordance with 40 CFR 60 Appendix A: Method 9 (Standards for Opacity) conducted and recorded annually. The averaging time shall be 3 minutes.

3. Compliance with the opacity standards for paved and unpaved roads contained within the ATC/OP shall be demonstrated in accordance with one of the following, as applicable:
   a. 40 CFR 60 Reference Method 9 (Standards for Opacity) ; or
   b. The test method set forth in AQR Subsection 94.12.4: Instantaneous Method.
4. Compliance with the minimum moisture content (2.5 percent at all processing points and storage piles) shall be demonstrated by conducting moisture testing and recording the results at least once a week on materials less than 0.25 inches in diameter in accordance with ASTM Standard C 566-97: Standard Test Method for Total Moisture Content of Aggregate by Drying.
   a. any active day within 1 hour of startup and within 1 hour of shutdown, but no less frequently than once during each 8 hour period of operation;
   b. within 10 feet from where crushed aggregate material is placed on the conveyor;
   c. within 10 feet from where the screened material is placed on the conveyor; and each stacker point.
5. Compliance with the silt content limits contained within this document shall be demonstrated using the test method explained in AQR Subsection 91.4.1.2.
6. Compliance with the silt loading limits contained within this document shall be demonstrated using the test method explained in AQR Subsection 93.4.1.2.
7. Areas deemed disturbed shall be determined by using the Drop Ball Test explained in AQR Section 90.
8. Pursuant to AQR Section 25, any upset/breakdown or malfunction that cause emissions of regulated air pollutants to exceed any limits set by regulation or by this permit, shall be reported to the Control Officer within 1 hour of the onset of such event.
9. Records and data required by this permit and maintained by owner/operator maybe audited, at the owner/operator's expense, at any time by a third party selected by the Control Officer.

## F PERFORMANCE TESTING

1. Compliance with opacity standards contained within the ATC/OP will be demonstrated in accordance with 40 CFR 60 Appendix A: Method 9 (Standards for Opacity) conducted and recorded annually. The averaging time shall be 3 minutes.
2. Initial performance tests shall be conducted within 60 days after achieving the maximum production rate at which the source will be operated but no later than 180 days after initial start-up.
3. Subsequent performance testing shall be conducted on or before the anniversary date of the initial performance test.
4. The owner/operator shall submit all required compliance and performance testing protocols for prior approval from DAQEM Compliance Reporting Supervisor and to the Enforcement Office of the US EPA, Region IX no earlier than 90 days prior to, and no later than 45 days prior to, the proposed dates of performance testing.
5. The Control Officer will consider approving the owner/operator's request for alternative performance test methods if proposed in writing in the performance test protocols.

6. A report describing the results of the performance test shall be submitted to DAQEM Compliance Reporting Supervisor and to the Enforcement Office of the US EPA, Region IX, within 60 days from the end of the performance test.
7. Pursuant to AQR Section 10 (as revised), the owner/operator of any stationary source or emission unit(s) that fails to demonstrate compliance with the emissions standard or limitations during any subsequent performance test, shall submit a compliance plan to DAQEM Compliance Reporting Supervisor within 90 days from the end of the performance test.
8. Pursuant to AQR Subsection 4.5 (as revised), additional performance testing may be required by the Control Officer.

## G RECORD KEEPING

1. All records and logs required by this document shall be kept by the owner/operator and made available to DAQEM for inspection immediately upon request.
2. All records and logs, or a copy thereof, shall be kept on site for a minimum of 5 years from the date the measurement or data was entered.
3. All records and logs shall contain, at minimum, the following information:
    a. hours of operation of all process equipment;
    b. length of the on-site haul road(s);
    c. log of dust control measures applied to the paved haul road, unpaved haul road, parking lot, vacant area;
    d. hourly, daily and annual production of materials mined and processed;
    e. results of moisture sampling;
    f. log of control device inspections, maintenance and repair;
    g. hours of operation of each engine/generator in a daily log with monthly summations;
    h. sulfur content of diesel fuel; and
    i. results of performance testing.

## H REPORTS AND REPORTING

1. Each annual report shall be:
    a. based on the preceding calendar year;
    b. submitted on or before March 31 each year; and
    c. addressed to the attention of the Compliance Reporting Supervisor, DAQEM.

2. Each report shall contain:
    a. as the first page of text, a signed certification containing the sentence “I certify that, based on information and belief formed after reasonable inquiry, the statements contained in this document are true, accurate and complete.” This statement shall be signed and dated by a responsible official of the company. (a sample form is available from DAQEM);
    b. an annual summary of all items listed in Section IV-G-3 (a-h);
    c. the calculated actual annual emissions from each emission unit, even if there was no activity, and the total calculated actual annual emissions for the source.

## I INCREMENT CONSUMPTION

Table IV-I-1 shows the location of the maximum impact and the potential PSD increment consumed by the source at that location. The impacts are below the PSD increment limits.

**Table IV-I-1: PSD Increment Consumption**

| Pollutant | Averaging Period | PSD Increment Consumption by the Source ($\mu g/m^3$) | Location of Maximum Impact | |
|---|---|---|---|---|
| | | | UTM X (m) | UTM Y (m) |
| $SO_2$ | 3-hour | 2.18[1] | 760331 | 4074454 |
| $SO_2$ | 24-hour | 0.78[1] | 760509 | 4074459 |
| $SO_2$ | Annual | 0.28 | 760586 | 4074865 |
| $PM_{10}$ | 24-hour | 28.99[2] | 760944 | 4074876 |
| $NO_x$ | Annual | 2.90 | 760586 | 4074865 |

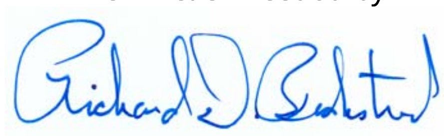
[1]Modeled High 2nd High Concentration
[2]Modeled High 6th High Concentration

## J OTHER REQUIREMENTS

1. Fees on all equipment and emissions are subject to AQR Section 18. The fee schedule is adjusted every January on the basis of the CPI.

## SIGNATURES

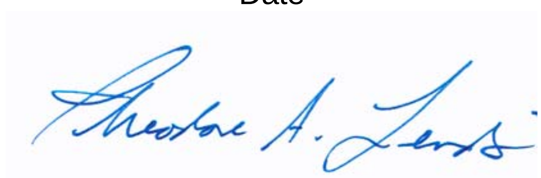
This ATC/OP Issued by:



**Signature:** Richard D. Beckstead
Permitting Manager
Clark County
Department of Air Quality and Environmental Management

August 13, 2007

Date



**Signature:** Theodore A. Lendis
Permitting Supervisor
Clark County
Department of Air Quality and Environmental Management

August 13, 2007

Date

The requirements of this ATC/OP with its conditions are accepted and agreed to by the company as evidenced by the hereinafter signature of an authorized company representative.

**Signature:** Travis Eaton
Responsible official for:
Precision Aggregate Products, LLC

Date

# Department of
# Air Quality & Environmental Management

500 S Grand Central Parkway 1st Fl • Box 555210 • Las Vegas NV 89155-5210
(702) 455-5942 • Fax (702) 383-9994

Lewis Wallenmeyer, Director • Alan Pinkerton, Deputy Director


August 17, 2007

7007 0710 0001 8278 3687

Travis Eaton
Precision Aggregate Products, LLC
P.O. Box 1458
Mesquite, NV 89027

**RE: Permit Facility #15694, Modification #:1, Revision #:0, Authority to Construct/Operating Permit (ATC/OP)**

Dear Mr. Eaton:

Attached is the Permit for the above-referenced business. **Please read, sign, and return the entire Permit, by September 14, 2007, after making a copy for your files.** In the event the due date falls on a weekend or holiday, *the permit must be received on the last business day preceding the weekend or holiday.*

We will be enforcing Regulation 12.8.3 as stated below:

**12.8.3** The AUTHORITY TO CONSTRUCT CERTIFICATE shall become enforceable and effective if the applicant signs and returns such ATC to the CONTROL OFFICER within thirty (30) days from the issuance date.

(a) If the AUTHORITY TO CONSTRUCT CERTIFICATE is not signed by the applicant and returned to the CONTROL OFFICER within the thirty (30) day period, then such ATC shall be deemed invalid.

(b) Revalidation of such ATC shall require reapplication for a new AUTHORITY TO CONSTRUCT CERTIFICATE which may be subject to additional fees.

If you have any questions please contact William Johnson at (702) 455-5942.

Best Regards,

Ashlie S. Miller
Permitting Division

Attachments

**KEY TO FILES ON CD-ROM**

***Modeling Archive***

***Toquop Energy Project Class II Dispersion Modeling***

**November 2007**

The following document summarizes the content of the AERMET, AERMAP, AERMOD and BPIP modeling archive. The contents of these folders are described below.

---

**AERMAP –** contains AERMAP files used to process terrain data (30-m DEM) to produce the receptor elevations and critical hill heights for use within the AERMOD model. AERMAP files were created for the multi-tier Cartesian receptor grid; additional receptors placed on terrain features, and receptors placed on the four hydrographic basins. Example files below are for the multi-tier Cartesian receptor grid.

| | |
|---|---|
| Toquop.inp | : AERMAP input file used for the multi-tier Cartesian receptor grid |
| Toquop.out | : AERMAP output file for the multi-tier receptor grid |
| Toquop.rou | : AERMAP file containing receptor elevations and critical hill heights for the Cartesian Grid |
| Run_AERMAP.bat | : AERMAP Batch file used to process AERMAP |
| AERMAP.exe | : AERMAP executable (Version 04300) |

AERMAP version 04300 was used instead of the latest posted version (06341) due to a runtime error in the later version of AERMAP when receptors fall between two DEM file domains, which is the case for this application. EPA has not yet fixed this bug. The AERMAP input and output files for the terrain receptor grid and the hydrographic basin receptor grid are in the **Hills** and **Basins** folders, respectively.

The terrain data files used in AERMAP are in the folder called **DEMs**. The raw DEM files were converted to DMO files with CRLF.exe.

---

**AERMET –** contains files used to process on-site surface meteorological data along with upper air data from Mercury, NV needed for AERMOD using AERMOD's meteorological pre-processor, AERMET.

| | |
|---|---|
| Onsite_06-07.dat | : AERMET input onsite meteorological data (edited version, after erroneous data was disqualified) |
| DRA_06-07_original.fsl | : AERMET input Desert Rock Mercury, NV unfilled upper air sounding file in FSL format. The file was obtained from http://raob.fsl.noaa.gov/ |

| | |
|---|---|
| DRA_06-07.fsl | : AERMET input Desert Rock Mercury, NV filled upper air sounding file in FSL format. The file was obtained from http://raob.fsl.noaa.gov/. Filling procedure described below. |
| 724754.txt | : AERMET input St. George surface data in TD-3505 format. |
| | |
| *.inp | : AERMET input files for Stage 1, 2 and 3 |
| *.err | : AERMET message file for stage 1, 2 and 3 |
| *.rep | : AERMET report file for Stage 1, 2 and 3 |
| *.ext | : AERMET upper air sounding extraction file |
| *.qa | : AERMET upper air sounding and onsite data quality assessment files |
| *.mrg | : AERMET Stage 2 merged file |
| Met_06-07.pfl | : AERMET profile output file (input to AERMOD) |
| Met_06-07.sfc | : AERMET surface output file (input to AERMOD) |
| Met_06-07-AN.pfl | : AERMET profile file truncated to 8760 hours |
| Met_06-07-AN.sfc | : AERMET surface file truncated to 8760 hours |
| | |
| RunMet.bat | : AERMET Batch files used to process AERMET |
| AERMET.exe | : AERMET executable (Version 06341) |

**Onsite data QA procedures :**

ENSR performed quality assurance of the onsite meteorological data located in the **onsite met data\1.onsite data** folder. Wind vector plots were produced using an ENSR-created program called "writemet.exe" which is also located in the **onsite met data\1.onsite data** folder. Writemet uses raw onsite data files and creates vector files for each day. These files are located in the **onsite met data\2.vector files** folder. The vector files were loaded to CALVIEW (free TRC software http://www.src.com/calpuff/download/mod6_gui.htm). The CALVIEW input files are located in the **onsite met data\3.CALVIEW input files** folder, and the files created from CALVIEW are located in the **onsite met data\4.image files and animations** folder. Data values that showed a large deviation from those of neighboring values in height and time were subject to disqualification. The unedited raw data file is called "onsite_06_07_original.dat" and the edited data file is called "onsite_06_07.dat". See "Readme – Onsite Data QA Procedures.doc" document for more details on creating and displaying the wind fields.

**Solar radiation QA procedures :**

We noticed that many of the nighttime solar radiation values in the onsite meteorological data are in the single digits rather than 0.0 $Wm^{-2}$ as they should be during nighttime. Because this seemed to be occurring over a large portion of the meteorological data period, we decided to conduct a sensitivity test to determine the impacts of the nighttime insolation values on the AERMET-produced surface file. These tests are located in the **Insolation Test Cases** folder.

Case 1, located in the **Case 1 – Original Onsite Data** folder, consisted of running AERMET with the original onsite data where the nighttime insolation values were not changed. The values were less than 10.0 $Wm^{-2}$, but greater than 0.0 $Wm^{-2}$.

Case 2, located in the **Case 2 – High Nighttime Insolation Values** folder, consisted of increasing the nighttime insolation values to 100.0 $Wm^{-2}$.

Case 3, located in the **Case 3 – Nighttime Insolation Values Set To Zero** folder, consisted of setting the nighttime insolation values to 0.0 $Wm^{-2}$.

By comparing the resulting surface files, we found that the nighttime insolation values are not used by AERMET and do not cause any changes in the AERMET surface file.

**<u>Upper air data QA procedures :</u>**

AERMET was run using upper air data from Desert Rock Mercury, NV. After reviewing the Stage3_06_07_original.err file, we found that the upper air data ("DRA_06-07_unfilled.fsl") had 124 days of missing soundings. These missing soundings had to be filled with soundings from another station.

A statistical comparison was performed on the Elko, NV and Flagstaff, AZ mixing height data from the AERMET-produced surface files to determine which site is a better match with Desert Rock mixing heights. AERMET was then run using Elko, NV and Flagstaff, AZ upper air data. The files for these runs are located in the folders called **Mixing Height Comparison\Elko** and **Mixing Height Comparison\Flagstaff**.

Then we copied the mixing height from the surface files, produced with Elko and Flagstaff, to a spreadsheet. The spreadsheet is located in the **Mixing Height Comparison** folder.

Time series plots and scatter plots of the 3-hour averaged afternoon mixing heights were created for Desert Rock, Elko, and Flagstaff. The plots indicated that Flagstaff matches Desert Rock better. Therefore, the Desert Rock missing data was filled in by Flagstaff soundings. In the event that Flagstaff was also missing, Elko was used (for 9 sounding periods). The final runs of AERMET with the filled-in upper air data are located in the **AERMET** folder and are described above.

**<u>Other procedures :</u>**

The precipitation data for Overton, NV are located in the **precip data** folder in .pdf format.

The spreadsheet in the **Land Use** folder called "AERMET Landuse 2006-2007.xls" contains land-use data within 3 km of the meteorological site.

Wind rose plots encompassing the entire modeling period, seasonal breakdowns, and daylight hours versus nighttime hours breakdowns are in the folder called **wind roses**.

---

**AERMOD –** contains input (*.inp), output (*.out), and source parameter (*.src) AERMOD files used with the Cartesian grid receptors as well as the Hydrographic Basin receptors.

Fugitive Sensitivity Directory: Sensitivity model runs performed for the fugitive sources to determine the worst case time period to be used in the subsequent modeling. For simplicity, all model runs were submitted with a 1 g/s emission rate. Example files below are from the locomotive.

BAS.inp : AERMOD input file used in the sensitivity modeling
BAS.out : AERMOD output file for the sensitivity modeling
BAS.src : AERMOD include file containing the source parameters and building downwash data (if applicable)

Significance Modeling Directory: Modeling files used in the determination of significance for TEP. Example files below are from the short term CO case. Similar files are included for $SO_2$, $PM_{10}$ and $NO_x$.

CO.inp : AERMOD input file used in Cartesian grid receptor modeling
CO.out : AERMOD output file for Cartesian grid receptor modeling
CO.src : AERMOD include file containing the source parameters and building downwash data

Basin Modeling Directory: Modeling was performed to determine the maximum impacts within individual hydrographic basins. Example files below are for the Lower Meadow Valley Basin. Similar files are included for the Tule Valley and Lower Moapa Valley basins.

Meadow_3hr_SO2.inp : AERMOD input file used in the basin modeling
Meadow_3hr_SO2.out : AERMOD output file for the basin modeling
3hr_SO2.src : AERMOD include file containing the source parameters and building downwash data

Cumulative Modeling Directory: Modeling was performed for pollutants in which TEP was determined to be significant. Inventory sources within the SIA were included in the modeling. Example files below are for annual $NO_x$. Similar files are included for 3 $SO_2$, 24 hour $SO_2$ and $PM_{10}$ and annual $PM_{10}$. Modeling was performed using the Cartesian grid receptors and Basin grid receptors.

| | |
|---|---|
| Ann_NOx.inp | : AERMOD input file used in the basin modeling |
| Ann_NOx.out | : AERMOD output file for the basin modeling |
| Ann_NOx.src | : AERMOD include file containing the source parameters and building downwash data |

| | |
|---|---|
| Run.bat | : AERMOD batch file to run all years of data. |
| AERMOD.exe | : The latest AERMOD executable (Version 07026) |

Toquop Class II Inventory.xls: List of sources included in the cumulative modeling analysis

Warning Message Sensitivity Runs: Two warning messages appeared in the $PM_{10}$ cumulative runs in reference to the road area sources from the inventory:

```
- W391   591 APARM :Aspect ratio (L/W) of area source greater than 10
- W320   593 APARM :Input Parameter May Be Out-of-Range for Parameter ANGLE
```

Two sensitivity runs were performed using one of the road segments:

1. Comparing the source as one long, thin road area source (as given in the inventory) with the same area source broken into four smaller area sources with aspect ratios less than 10.
2. Comparing the source using original orientation angle of 210º (from the inventory) to one with an orientation angle of -150º.

The breaking of the long, thin area source into four smaller area sources yielded results that differed less than 1.0%. Changing the orientation angle showed no difference in the results. Therefore no changes were made to the $PM_{10}$ road area sources in the cumulative modeling. Example files below are from the aspect ratio sensitivity modeling.

| | |
|---|---|
| Area_Test_AR.inp | : AERMOD input file used in the aspect ratio sensitivity modeling |
| Area_Test_AR.out | : AERMOD out put file from aspect ratio sensitivity modeling |
| Area_Test_ AR.src | : AERMOD include file containing the area source parameters |

---

**BPIP –** contains BPIP input and output files.

| | |
|---|---|
| Toquopf.bpi | : BPIP input file |
| Toquopf.pro | : BPIP output file |
| Toquopf.sup | : BPIP summary file |
| BPIPPRM.exe | : BPIP executable file, with PRIME |

# APPENDIX 8-B
# CALPUFF MODELING INPUT / RESULTS

# APPENDIX 8B
# CLASS I MODELING REPORT

## 8B.1 Introduction

### 8B.1.1 Introduction and Project Description

The applicant, Toquop Energy, LLC (Toquop Energy), plans to build and operate one new nominal 750-megawatt super critical pulverized coal (PC) fired boiler and steam electric generation unit located in Lincoln County, Nevada. The proposed project, referred to as the Toquop Energy Project (TEP), is being sited in a green-field location approximately 14 miles northwest of Mesquite, Nevada.

The new unit will result in emission increases of all criteria pollutants above the Prevention of Significant Deterioration (PSD) threshold limits. Therefore, all criteria pollutants are subject to PSD review and thus a subsequent Class I modeling analysis was performed to assess the impacts of sulfur dioxide ($SO_2$), sulfates ($SO_4$), oxides of nitrogen ($NO_X$), and particulate matter with an aerodynamic diameter of 10 microns or less ($PM_{10}$) emissions from the proposed project on nearby PSD Class I areas.

The TEP includes the full range of support operations, including delivery of lime for use in scrubber; truck delivery of diesel fuel; and truck delivery of other materials, such as aqueous ammonia for the selective catalytic reduction control system, coal and ash handling, and transport of combustion byproducts and wastes. Best available control technology will be installed on all applicable sources, including the main stack.

This document (revised according to comments received from the National Park Service in January 2007) describes the procedures that have been used to evaluate the potential air quality impacts due to the proposed project's operations for PSD Class I areas. There are no Class I areas located within 50 kilometers (km) of the proposed facility, so the modeling procedures only address long-range transport techniques. A separate report addresses the modeling of impacts within 50 km of the proposed project site.

### 8B.1.2 Modeling at Class I Areas

PSD regulations require that facilities within 100 km of a PSD Class I area perform a modeling evaluation of the ambient air quality in terms of Class I PSD Increments and Air Quality Related Values. In addition, large projects beyond 100 km (but less than 300 km) from the nearest Class I area have generally been requested to conduct an evaluation of air quality impacts by the Federal Land Managers (FLMs).

**Figure 8B-1** shows the location of the TEP relative to the nearest PSD Class I areas. The following Class I areas have been assessed for this analysis:

- Bryce Canyon National Park:
- Capitol Reef Wilderness;
- Grand Canyon National Park;
- Sycamore Canyon Wilderness; and
- Zion National Park.

There are no other Class I areas within 300 km of the facility, and the National Park Service has approved this list of Class I areas to be analyzed for the TEP. Project impacts for $SO_2$, sulfuric acid ($H_2SO_4$), nitrogen dioxide ($NO_2$), and $PM_{10}$, pollutants subject to PSD review, have been assessed for the Class I areas (and portions thereof) within 300 km of the facility.

Since the Class I areas are located more than 50 km from the proposed facility, the CALPUFF model, along with CALMET, the meteorological pre-processor, has been applied in a refined mode (Scire et al. 2000a,b). To the extent possible (except for updates that have occurred since the issuance of the December 2000 FLM's Air Quality Related Values Workgroup [FLAG] guidance), the modeling procedures have followed those procedures prescribed in the FLMs' FLAG guidance documents, as noted below.

The guidance in Interagency Workgroup on Air Quality Modeling (IWAQM) Phase II suggests that CALPUFF could be first used in a screening mode and then a refined mode if needed. ENSR has used CALPUFF in a refined mode for 3 recent years involving mesoscale meteorological (MM5) input data (2003, 2004, and 2005).

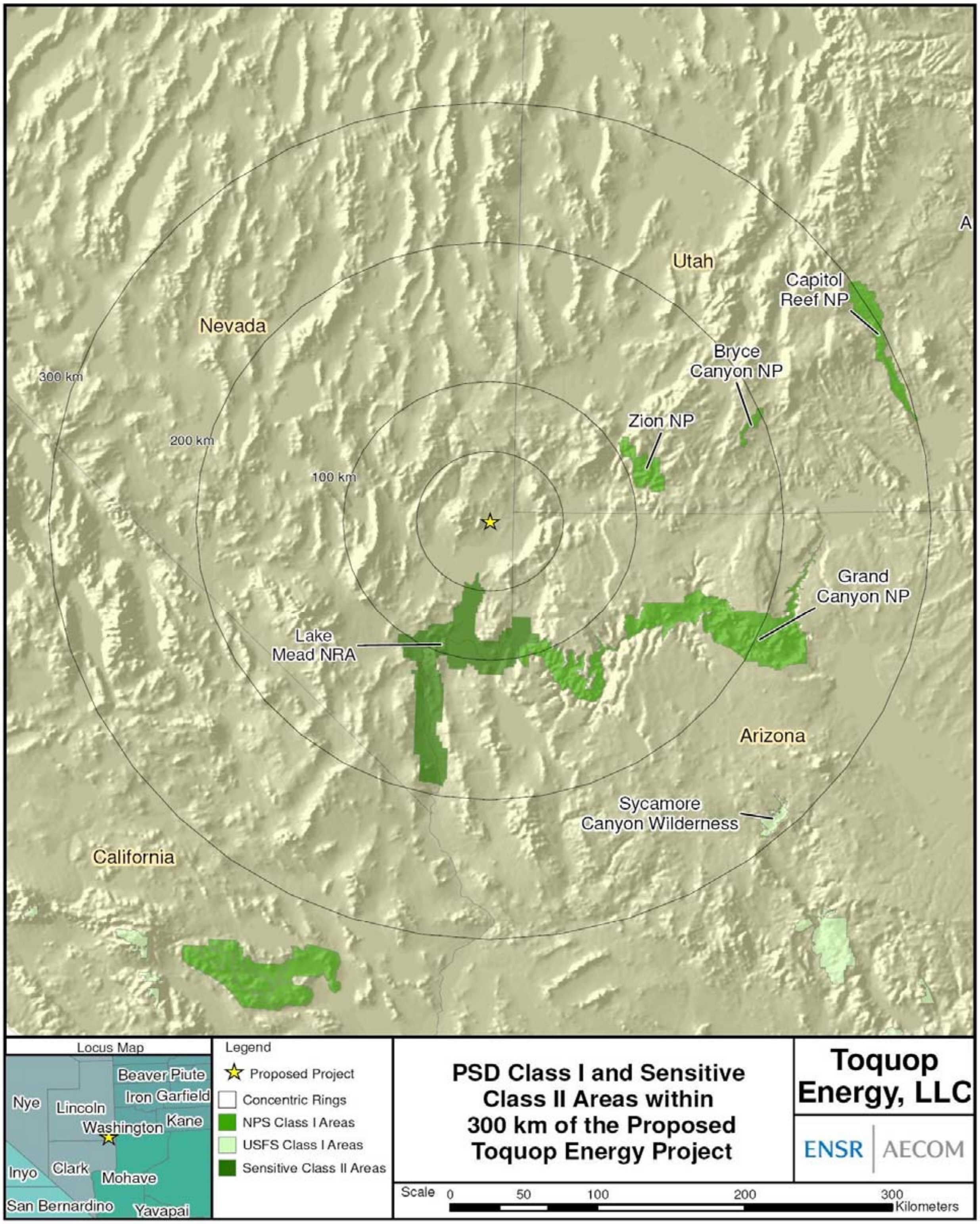
### 8B.1.3 Modeling for Sensitive Class II Areas

CALPUFF modeling also was conducted to determine the impacts of TEP on nearby sensitive Class II area(s). At the request of the FLMs, modeling was conducted at Lake Mead National Recreation Area (NRA) (see **Figure 8B-1**) to determine TEP's impacts on PSD increment, regional haze, and acidic deposition. The modeling was conducted for this area in a similar manner to the Class I modeling discussed in this report.

### 8B.1.4 Report Organization

The modeling procedures conducted for this analysis are based on requirements outlined in the IWAQM Phase II report (IWAQM 1998) and the FLMs' FLAG Phase I Report (December 2000, found at http://www2.nature.nps.gov/ard/flagfree/index.htm). These guidance documents provide

**Figure 8B-1. Location of Nearby Class I Areas in Relation to Toquop**



suggested modeling approaches by U.S. Environmental Protection Agency (USEPA) and the FLMs. In addition, recent suggestions by the FLMs for acceptable alternative analyses to supplement the results obtained using the FLAG guidance has been considered for regional haze impacts.

This appendix has been prepared in order to summarize the procedures and results of the Class I area impact assessment. Section 8B.2 of this appendix document discusses the emission sources used for the modeling. Section 8B.3 outlines an approach for a refined CALPUFF analysis of the proposed project and Section 8B.4 summarizes the modeling results. Section 8B-5 shows results of the VISCREEN analysis for Lake Mead NRA. A list of meteorological stations used in the preparation of the CALMET output is provided in Section 8B.6. References are listed in Section 8B.7.

## 8B.2 Emission and Source Parameters

### 8B.2.1 Proposed Project Emission Sources

Class I area modeling has been conducted to evaluate PSD increment consumption of $SO_2$, $NO_2$, and $PM_{10}$, as well as regional haze and sulfur and nitrogen deposition at Bryce Canyon, Capitol Reef, Grand Canyon, Sycamore Canyon, and Zion. The proposed project's main unit will operate on low-sulfur Powder River Basin sub-bituminous coal. The proposed boiler will be a supercritical PC fired unit, designed for base load operation. The PC unit will have an estimated maximum gross heat input of approximately 6,048 million British thermal units/hour (MMBtu/hour). It is anticipated that the boiler will be dry-bottom, tangentially fired or wall fired with low-$NO_X$ burners and overfire air ports. Flue gas from the unit will pass through a series of post-combustion controls before being emitted to the atmosphere through a single Good Engineering Practice (GEP) stack with a height of 730 feet (subject to change depending upon final design building dimensions). **Table 8B-1** provides a summary of the main boiler's emission rates and stack parameters.

All other ancillary equipment, such as the cooling tower and auxiliary boilers, have not been included in the Class I impact analysis because the impacts from these sources are present only during startup conditions in some cases, and will otherwise likely be confined in any case to within a few km of the proposed facility location. This also is true of locomotive emissions (applicable only when the locomotive is on-site during coal unloading), for which a sensitivity run provided with the modeling archive will show that this source's impact is well below 1 percent of the main stack's impact, and not correlated in time and space with the main stack impacts due to the much lower plume height.

The primary $PM_{10}$ emissions were speciated according to procedures in recently submitted PSD permit applications for purposes of regional haze impact predictions. The National Park Service

(NPS) has requested that the $PM_{10}$ be broken down into separate components based on the particles' light scattering properties. Those components are: 1) soils, 2) elemental carbon, and 3) organic aerosols. These components are modeled separately because their light scattering/absorption effectiveness differs. For example, elemental carbon is 10 times greater in terms of visibility degradation potential than that of the "soils" (e.g., ash or "soils") portion of $PM_{10}$ emissions.

**Table 8B-1**
**Preliminary Maximum Hourly Emission Rates of Criteria Pollutants for the PC Boiler**

| Pollutant | Main Unit Maximum Hourly Emission Rates (1) (lb/hour) | | Main Unit Maximum Hourly Emission Rates (1) (lb/MMBtu) | |
|---|---|---|---|---|
| $NO_X$ | 362.9 | | 0.06 | |
| $PM_{10}$ (Filterable) | 60.5 | | 0.01 | |
| $PM_{10}$ (Filterable and condensable)(2)(3) | 181.4 | | 0.03 | |
| $SO_2$ 3-hour(4) | 483.8 | | N/A | |
| $SO_2$(5) | 362.9 | | 0.06 | |
| $H_2SO_4$ Mist | 30.2 | | 0.005 | |
| **Stack Parameters** | **English Units** | | **Metric Units** | |
| Heat Input | 6,048 | MMBtu/hr | -- | -- |
| Stack Height | 730 | ft | 222.5 | m |
| Stack Diameter | 24.4 | ft | 7.44 | m |
| Stack Exit Velocity | 65 | f/s | 19.81 | m/s |
| Stack Gas Temperature | 130 | F | 327.59 | K |
| **Stack Location** | | | | |
| | 746,849.22 East<br>4,091,219.39 North | UTM Zone 11<br>NAD-1983 (meters) | -150.357 East<br>27.068 North | LCC<br>(km) |
| Base Elevation | 2,551 | ft | 777.51 | M |

1 Based on a heat input of 6048 MMBtu/hr @ 100% load.
2 Includes $H_2SO_4$ mist.
3 $PM_{10}$ speciated according to the following percentages (based on NPS data):
Soils = 96.3% of fine filterable $PM_{10}$
Elemental Carbon = 3.7% of fine filterable $PM_{10}$
Organics = non-sulfate condensable $PM_{10}$
4 3-hour average $SO_2$ emission rate has been estimated at 483.8 lbs/hr. The modeling results for 24-hour emission rates have been adjusted accordingly for reporting results for 3-hour averages.
5 Annual $SO_2$ limit is equivalent to 1351 TPY.

The "modeled" soils component of the primary $PM_{10}$ emissions consists of soils plus inorganic aerosols because they are assumed to have similar light scattering properties. Soils are assumed to be 96 percent of the fine filterable $PM_{10}$. The organic aerosols "modeled" component of the primary $PM_{10}$ emissions is assumed to be the non-sulfate condensable portion of $PM_{10}$. The elemental carbon "modeled" component of the primary $PM_{10}$ emissions is assumed to be 3.7 percent of the fine filterable $PM_{10}$.

A particle size speciation using AP-42 emission factors also has been considered. In addition to speciating the primary $PM_{10}$ emissions, the CALPUFF regional haze modeling procedures typically consider primary $SO_4$ emissions (derived from $H_2SO_4$). Primary emissions of $SO_4$ are modeled because calculations of regional haze are sensitive to $SO_4$, which combine with free atmospheric ammonia to form light-scattering ammonia sulfate fine particles.

In addition to breaking the $PM_{10}$ down into different components based on light scattering properties, the primary $PM_{10}$ emissions also were broken down into different components based on a size distribution. The size distribution is used to more accurately reflect the rate at which the $PM_{10}$ gravitationally settles out of the atmosphere and how differently sized particles affect light scattering/absorption. The size distributions are based on the AP-42, Tables 1.1-5 and 1.1-6. This size distribution is shown in **Table 8B-2**. The filterable $PM_{10}$ emissions are distributed by the applicable size distributions in AP-42, Table 1.1-6. Table 1.1-5 of AP-42 indicates that condensable PM can be assumed to be < 1.0 micron in diameter. Therefore, the condensable emissions are assigned to the smallest size category.

**Table 8B-2**
**Size Distribution of Particulate Matter Used in CALPUFF Modeling**

| Aerodynamic Diameter (µm) | Filterable $PM_{10}$ Only (%) | Condensable $PM_{10}$ Only (%) |
|---|---|---|
| 6 – 10 | 16.3 | - |
| 2.5 – 6 | 26.1 | - |
| 1.25 – 2.5 | 23.9 | - |
| 1.0 – 1.25 | 6.5 | - |
| 0.625 – 1.0 | 12.0 | - |
| 0.5 – 0.625 | 15.2 | 100.0 |
| Total | 100.0 | 100.0 |

[1] Data obtained from USEPA's AP-42, Table 1.1-6 (baghouse).

CALPUFF was run using the $SO_2$ and $NO_2$ emissions in **Table 8B-1** and the $PM_{10}$ emissions in **Table 8B-3**, which total to the same $PM_{10}$ emissions shown in **Table 8B-1**. For the regional haze analysis, the POSTUTIL postprocessor was used to scale each "size" component of the primary $PM_{10}$ based on the calculated emission rates in **Table 8B-4** for each light scattering component.

**Table 8B-3**

**Particle Size Distribution Emission Rate Summary used for the CALPUFF Run to Determine the Maximum $PM_{10}$ Concentrations**

| Geometric Mass Mean Diameter (µm) | $PM_{10}$ Emissions (g/s) |
|---|---|
| | 100 % Load |
| 6 – 10 | 1.2424 |
| 2.5 – 6 | 1.9879 |
| 1.25 – 2.5 | 1.8222 |
| 1.0 – 1.25 | 0.4970 |
| 0.625 – 1.0 | 0.9111 |
| 0.5 – 0.625 | 16.4004 |

**Table 8B-4**

**Particle Size Distribution Emissions for the Regional Haze Analysis**

| Geometric Mass Mean Diameter (µm) | Soils (g/s) | Organic (g/s) | Elemental Carbon (g/s) |
|---|---|---|---|
| 6 – 10 | 1.2424 | 0.0000 | 0.0000 |
| 2.5 – 6 | 1.9879 | 0.0000 | 0.0000 |
| 1.25 – 2.5 | 1.7548 | 0.0000 | 0.0674 |
| 1.0 – 1.25 | 0.4786 | 0.0000 | 0.0184 |
| 0.625 – 1.0 | 0.8774 | 0.0000 | 0.0337 |
| 0.5 – 0.625 | 1.1167 | 11.4307 | 0.0429 |

## 8B.3 CALPUFF Modeling Approach

CALPUFF was promulgated by the USEPA (2003a) as a preferred dispersion model to assess long-range transport applications (transport distances exceeding 50 km, but no more than 300 km unless the nearest Class I areas is beyond 300 km). For the proposed project, the distance to each of the PSD Class I areas is greater than 50 km, and there are five Class I areas within 300 km. Within this distance range, a non-steady-state modeling approach that considers spatial and time variations in meteorological conditions, such as CALPUFF, is appropriate.

### 8B.3.1 Modeling Procedures

#### 8B.3.1.1 Selection of Dispersion Model

In accordance with guidance provided by USEPA Region 9, ENSR has run CALPUFF Version 5.711a, the current “official USEPA version”, (level 040716) in a refined mode to determine the effect that the proposed project’s emissions had on $SO_2$, $NO_2$, and $PM_{10}$ increment, regional haze, and sulfur and nitrogen deposition at the nearby Class I areas. CALMET Version 5.53a (level 040716) is the companion official USEPA version of the meteorological pre-processor for the CALPUFF modeling system that produces three-dimensional wind fields that incorporate a variety of meteorological data observations and terrain effects. Advanced meteorological data in the form of prognostic mesoscale meteorological data (such as the Fifth Generation Mesoscale Model [MM5]) has been used to provide a superior estimate of the initial wind fields. This application has considered 3 years, 2003 through 2005, of prognostic MM5 meteorological data at a 12-km resolution. The 2003 through 2005 12-km MM5 databases were provided by Mr. Dennis McNally of Alpine Geophysics.

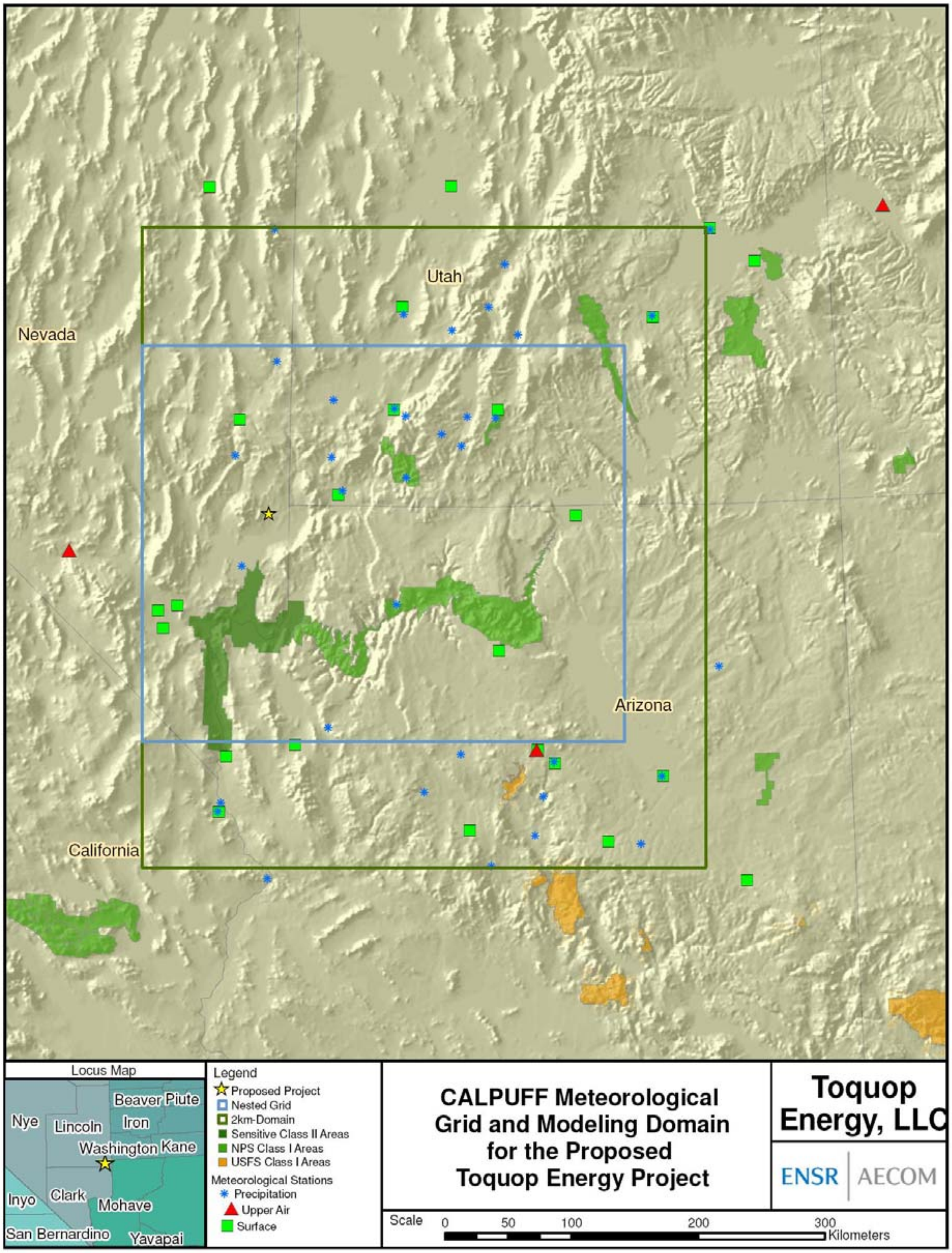
#### 8B.3.1.2 Computational Grid

ENSR has used two separate CALMET and CALPUFF grid systems for this analysis. The first grid system (2-km resolution) extends 100 km west of the source and at least 50 km in all other directions beyond the TEP site along with any portions of Capitol Reef and Sycamore Canyon within 300 km of the proposed project site (see **Figure 8B-2**). The additional buffer distance allows for the consideration of puff trajectory recirculations. This design allows for a 444 km (east-west) x 504 km (north-south) domain extent and at a 2-km resolution there are 222 x 252 horizontal grid cells.

The CALPUFF model developer has noted in instructional courses that puff impacts in complex terrain can be refined with a finer grid spacing. Therefore, an additional nested meteorological and computational grid was used to refine the depiction of terrain features made in CALMET for the closest Class I areas (see **Figure 8B-2**). Specifically, a 500-m nested grid was used to process impacts at Bryce Canyon, Grand Canyon, and Zion. Capitol Reef and Sycamore Canyon impacts were processed on the main 2-km grid due to their greater distance from the project site. As in the case of the 2-km grid, the nested 500-m grid was designed to accommodate TEP, the Class I areas being considered for that grid, and a 50-km (100 km west of source) buffer about the site and Class I area(s). The 500-m grid has a 382 km (east-west) x 312 km (north-south) domain extent and at a 500-m resolution there are 764 x 624 horizontal grid cells.

The vertical resolution of both grids was consistent among the CALMET applications and consisted of the following vertical layers (12): 0; 20; 40; 80; 120; 180; 260; 400; 600; 800; 1,200; 2,000; and 4,000 meters. The maximum mixing height was established as 3,500 meters based upon afternoon summertime mixing heights provided by Holzworth (1972). Due to the large transport distances involved in this analysis (Class I areas beyond 200 km from the project site), the puff splitting option, as recommended by EPA, was used for the Class I modeling.

**Figure 8B-2. CALPUFF Modeling Domain used for Toquop**



As noted in FLAG (2000), if a project-related change in extinction is less than 5 percent of the background extinction, then the project's regional haze impact is determined to be insignificant and no further modeling is required to demonstrate no adverse impact. If the project-related change in extinction exceeds 5 percent, then further analysis may be warranted, depending upon the magnitude and frequency of the impacts. If further analysis was required, we would consider presenting an alternative analysis for additional information to be considered by the permitting authority and the FLMs, as noted below. The reviewers would then analyze the information being submitted and consider whether a conclusion of no adverse impact is reasonable.

An alternative visibility analysis consistent with the BART approach also was considered because the FLAG approach with Method 2 does not handle cases of meteorological interference. This approach has been presented in various venues by the FLMs as an alternative to the FLAG screening approach that is designed to assess visibility impacts at Class I areas. This BART approach uses Method 6 along with monthly average f(RH) values and reports the 98$^{th}$ percentile day (8$^{th}$ highest for each year, and 22$^{nd}$ highest over 3 years) to determine whether the proposed project has an impact over a 5 percent change in extinction at the 98$^{th}$ percentile value. A "Tier 1" approach uses the best 20 percent background extinction for comparison, while a "Tier 2" approach uses the annual average background extinction. The FLMs have suggested that, in a future version of the FLAG guidance, if a source's impacts are below a 5 percent change in extinction at the 98$^{th}$ percentile value for each year modeled, they would likely not object to the PSD permit being issued.

For the sensitive Class II area(s) that are greater than 50 km from the TEP, an assessment of regional haze impacts using CALPUFF has been performed. Since there are portions of Lake Mead NRA both within 50 km and beyond 50 km a regional haze analysis and a visible plume blight analysis is appropriate. Section 8B3.2.6 discusses the visible plume blight analysis for Lake Mead. Regional haze impacts for Lake Mead NRA are provided for informational purposes. We note that sensitive Class II areas are not held to the same stringent standard for regional haze impacts as the Class I areas are. Results for the regional have analyses are presented in Section 8B- 4.

#### 8B.3.2.5 Acidic Deposition

CALPUFF and CALPOST have been applied to obtain upper limit estimates of annual wet and dry deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions from the main boiler stack at Bryce Canyon National Park, Capitol Reef Wilderness, Grand Canyon National Park, Sycamore Canyon Wilderness, and Zion National Park. Specifically, CALPUFF has been used to model both wet and dry deposition of $SO_2$, $SO_4$, nitrates, and nitric acid as well as dry

Due to the size of the modeling domains used for this analysis, a Lambert Conformal Conic (LCC) coordinate system was used. The LCC projection was used because it accounted for the curvature of the Earth's surface. The LCC projection for this analysis was based on the WGS-84 datum and standard parallels of 30°N and 60°N, with an origin of 36.7°N and 112.5°W.

#### 8B.3.1.3 CALMET Processing

In accordance with the IWAQM Phase II guidance, CALMET, the CALPUFF meteorological pre-processor, has been used to simulate 3 years (2003, 2004, and 2005) of meteorological conditions. The non-default user-defined settings proposed for the CALMET processing are provided in **Table 8B-5**. Both grids have been processed using the same data, CALMET settings, and CALMET options. For the hourly wind field initialization, CALMET use gridded prognostic mesoscale meteorological (MM5) data for all years. For all years, MM5 data at a 12-km resolution is available within the modeling domain.

**Table 8B-5**
**CALMET User-Defined Setting without Default Values**

| Variable | Description | Value |
|---|---|---|
| IEXTRP | Extrapolation of surface winds to upper layers | -4 |
| RMAX1 | Max surface over-land extrapolation radius (km) | 12 |
| RMAX2 | Max aloft over-land extrapolation radius (km) | 30 |
| RMAX3 | Maximum over-water extrapolation radius (km) | 100 |
| TERRAD | Radius of influence of terrain features (km) | 10 |
| R1 | Relative weight at surface of Step 1 field and obs | 6 |
| R2 | Relative weight aloft of Step 1 field and obs | 20 |
| IUPT | Station for lapse rates | Mercury (KDRA), NV |
| IPROG | Gridded initial prognostic wind field – MM4/MM5 data | 14 |

These prognostic meteorological data sets were initially combined with (depending on which grid size was being processed) the 2-km and 500-m grid resolution terrain and land use data to more accurately characterize the wind flow throughout the modeling domain. The gridded terrain data has been derived from U.S. Geological Survey (USGS) 1:250,000 (3 arc second or 90-meter grid spacing) Digital Elevation Model files and the TERREL pre-processor program. The gridded land use data has been derived from USGS 1:250,000 Composite Theme Grid land use files.

The Step 2 wind field has been produced using the input of all available National Weather Service (NWS) hourly surface and twice-daily upper air balloon sounding data within and just outside the modeling domain. Hourly surface data from both first-order and second-order stations have been considered in this analysis. Other sources of meteorological data such as CASTNET data have been used to supplement areas lacking NWS or second-order data. Hourly precipitation data from stations within and just outside of the modeling domain have been taken from a National Climatic Data Center data set for purposes of wet scavenging of the plume and wet deposition calculations. A list of these stations is provided in Section 6. **Figure 8B-2** shows a plot of the surface, upper air, and precipitation stations used as input to CALMET as a part of the Step 2 wind field.

#### 8B.3.1.4 Receptors

Receptors from the National Park Service (NPS) database of Class I receptors have been used for this modeling analysis (found at: http://www2.nature.nps.gov/air/maps/Receptors/index.htm) for Bryce Canyon, Capitol Reef, Grand Canyon, Sycamore Canyon, and Zion. To accommodate the processing of the Grand Canyon with two separate grid resolutions, the NPS receptors were split into to separate groups according to the design of the domains. All modeled receptors were at least greater than 50-km from the edge of their respective modeling domains.

Receptors for Lake Mead were developed with a 500-m resolution for areas within 50 km of TEP. Beyond 50 km, the receptor spacing was 2 km spacing out to about 70 km from TEP, and 5-km receptor spacing was used for the rest of the area. The increased spacing with increasing distance was used in order to keep the total number of receptors for the area to a value of about 500. Receptor elevations were calculated using 90-m spaced Digital Elevation Model files and the TERREL program.

#### 8B.3.1.5 Good Engineering Practice Stack Height Analysis

A GEP stack height analysis has been performed based on the proposed project design to determine the potential for building-induced aerodynamic downwash for the proposed main boiler stacks. The analysis procedures described in USEPA's Guidelines for Determination of Good Engineering Practice Stack Height (USEPA 1985), Stack Height Regulations (40 Code of Federal Regulations 51), and current model clearinghouse guidance have been used.

However, since the stack is at or near the GEP formula height, building downwash effects can be considered negligible and therefore were not included in the modeling analysis.

### 8B.3.2 Assessing Air Quality Impacts at Class I and Sensitive Class II Areas

#### 8B.3.2.1 Background Air Quality Data

The CALPUFF refined modeling has been conducted with hourly background ozone data from rural monitors within and just outside the modeling domain. In the absence of hourly ozone data for the monitoring stations used in the analysis during a particular hour, the model default of 80 ppb has been used. In addition, monthly-averaged ammonia background values agreed upon by the NPS as part of the Desert Rock Class I modeling analyses have been used. The monthly ammonia background values are summarized below:

- December, January – March: 0.2 ppb
- April – May: 0.5 ppb
- June – September: 1.0 ppb
- October – November: 0.5 ppb.

#### 8B.3.2.2 Class I PSD Increment Values

CALPUFF and CALPOST have been used with CALMET meteorological data to assess maximum concentrations of $SO_2$, $NO_2$, and $PM_{10}$ due to emissions from the main boiler stacks at Bryce Canyon, Capitol Reef, Grand Canyon, Sycamore Canyon, and Zion. It was conservatively assumed that 100 percent of the $NO_X$ emissions were converted to $NO_2$. The modeled concentrations at all receptors within the Class I areas have been documented and compared to their proposed significant impact level (SILs) shown in **Table 8B-6**; these SILs have been accepted by the FLMs in their review of the modeling protocol. Results of the PSD increment analysis are presented in Section 8B-4. If a modeled impact is below the applicable listed concentration in **Table 8B-6**, then the project will be assumed to have an insignificant impact, and no further modeling will be required for increment consumption analyses for that pollutant and averaging time. Results of the PSD increment analysis for the Class I areas are presented in Section 8B-4.

**Table 8B-6**
**Class I Area SILs**

| Pollutant | 3-hour* ($\mu g/m^3$) | 24–hour* ($\mu g/m^3$) | Annual** ($\mu g/m^3$) |
|---|---|---|---|
| $SO_2$ | 1.00 | 0.20 | 0.10 |
| $PM_{10}$ | NA | 0.32 | 0.16 |
| $NO_2$ | NA | NA | 0.10 |

* Highest of the second-highest modeled concentrations at any receptors.
**Highest arithmetic mean concentration at any receptor.
NA = not applicable.

### 8B.3.2.3 Class II PSD Increments (Sensitive Class II Areas)

CALPUFF and CALPOST have been used to assess maximum concentrations of $SO_2$, $NO_2$, and $PM_{10}$ due to emissions from the main boiler stacks at Lake Mead NRA. The modeled concentrations at all receptors within these sensitive Class II areas have been documented and compared to their significant impact level (SILs) shown in **Table 8B-7**. Results of the PSD increment analysis for Lake Mead NRA are presented in Section 8B-4.

**Table 8B-7**
**Class II Area SILs**

| Pollutant | 3-hour (μg/m$^3$) | 24–hour (μg/m$^3$) | Annual (μg/m$^3$) |
|---|---|---|---|
| $SO_2$ | 25.0 | 5.0 | 1.0 |
| $PM_{10}$ | NA | 5.0 | 1.0 |
| $NO_2$ | NA | NA | 1.0 |

NA = not applicable.

### 8B.3.2.4 Regional Haze

CALPUFF and CALPOST processing have been used for the regional haze analysis to compute the maximum 24-hour average light extinction due to $SO_2$, $SO_4$, $NO_2$, and $PM_{10}$ emissions from the main boiler stack at Bryce Canyon National Park, Capitol Reef Wilderness, Grand Canyon National Park, Sycamore Canyon Wilderness, and Zion National Park.

The computation of incremental background light extinction due to the proposed project's emissions uses the option to calculate extinction from speciated particulate matter measurements by applying the USEPA-recommended hourly relative humidity adjustment factors to background and modeled sulfate and nitrate (MVISBK=2). The USEPA-recommended hourly relative humidity adjustment factors also were used and were published in September 2003 "Guidance for Tracking Progress Under the Regional Haze Rule" (USEPA 2003b). FLAG guidance recommends that the hygroscopic particle growth curve be capped when the relative humidity exceeds 98 percent, although the FLMs are now allowing a cap of 95 percent. This cap is consistent with monitoring guidance in support of the IMPROVE program that flags nephalometer measurements with relative humidities of at least 95 percent (and transmissometer measurements with relative humidities of at least 90 percent) that correspond to hours with meteorological interferences. Therefore, for this analysis, ENSR capped the particle growth curve at 95 percent relative humidity.

deposition of $NO_2$ to estimate the maximum annual wet and dry deposition of sulfur and nitrogen at the Class I areas.

The deposition results are documented for evaluation. However, it is noted that the U.S. Department of Agriculture Forest Service (USFS) web site (http://www.fs.fed.us/r6/aq/natarm/document.htm) indicates that the minimum detectable level for measuring an increase in wet deposition of sulfates or nitrates is 0.5 kg/ha/yr. For conservatism, the USFS recommends a significance level of one-tenth of this minimum detectable level, or 0.05 kg/ha/yr. The FLM also has recently developed a Deposition Analysis Threshold (DAT) of 0.005 kg/ha/yr in the west (FLAG 2002) to be used as a threshold for further FLM analysis, rather than as an adverse impact threshold (Porter 2004).

It is important to note that the DAT value was established because the FLMs are concerned that, over time, cumulative deposition from emission sources may produce impacts upon Class I areas that are of concern. The FLMs need to have a reasonable assurance that cumulative deposition from all new sources does not exceed 50 percent of natural background. Natural background in western Class I areas is 0.25 kg/ha/yr. This value was multiplied by 0.5 to attain 50 percent of natural background and by 0.04, which is a safety factor to account for cumulative new source growth consisting of 25 identical facilities in the area of concern (0.25 x 0.5 x 0.04 = 0.005). Therefore, the use of a 0.005 kg/ha/yr threshold of concern for a new PSD source is very conservative due to the assumption of cumulative growth and due to not considering a substantial reduction in deposition from reductions in $SO_2$ emissions in the west that will be part of the Regional Haze Rule program. If the project emissions exceed the DAT for either sulfur or nitrogen, then the project may elect to gather a cumulative inventory of $SO_2$ or $NO_2$ emissions to provide a comparison of combined emissions to 50 percent of natural background. Deposition results are presented in Section 8B-4.

#### 8B.3.2.6 VISCREEN Analysis

The PSD regulation requires an analysis of visibility impairment (i.e., plume blight) at Class I areas within 50 km of a proposed PSD project. There are no Class I areas within 50 km of TEP; however, the FLMs have requested that a plume visibility impairment analysis be performed for the portions of Lake Mead NRA that fall within 50 km of TEP.

The plume visibility analysis was conducted with the most current version of USEPA's screening model VISCREEN to determine if project emissions will impair visibility at the Lake Mead NRA. VISCREEN was applied with the guidance provided in USEPA's Workbook for Plume Visual Impact Screening and Analysis (1992) ("Workbook"). As such, the VISCREEN model was applied to estimate two visual impact parameters, plume perceptibility (ΔE) and plume contrast (Cp).

Screening-level guidance indicates that values above 2.0 for ΔE and +/- 0.05 for Cp are considered perceptible. The Workbook offers two levels of analysis. Level 1 screening analysis which is the most simplified and conservative approach employing default meteorological data with no site-specific conditions. The Level 2 analysis takes into account representative meteorological data and site-specific conditions such as complex terrain. VISCREEN results are presented in Section 8B-5.

## 8B.4 Refined CALPUFF Model Results

### 8B.4.1 PSD Class I Increment Analysis

CALPUFF modeling was used to estimate the maximum ambient concentrations of $SO_2$, $NO_2$, and $PM_{10}$ at Bryce Canyon National Park, Capitol Reef National Park, Grand Canyon National Park, Sycamore Canyon Wilderness, and Zion National Park to compare to USEPA-proposed Class I SILs (see **Table 8B-6**). The CALPOST program was used to obtain pollutant-specific impacts for the pertinent averaging periods.

The PSD increment modeling results for the proposed project emissions are provided in **Table 8B-8**. The modeling results indicate that the proposed project has insignificant impacts for all pollutants and averaging times for all years modeled. Therefore, no additional modeling for PSD increment consumption is required for any of the PSD Class I areas.

### 8B.4.2 PSD Class II Increment Analysis

CALPUFF modeling was used to estimate the maximum ambient concentrations of $SO_2$, $NO_2$, and $PM_{10}$ at Lake Mead NRA to compare to USEPA Class II SILs (see **Table 8B-7**). The CALPOST program was used to obtain pollutant-specific impacts for the pertinent averaging periods.

The PSD increment modeling results for the proposed project emissions are provided in **Table 8B-9**. The modeling results indicate that the proposed project has insignificant impacts for all pollutants and averaging times for all years modeled. Therefore, no additional modeling for PSD increment consumption is required for Lake Mead NRA.

### 8B.4.3 Regional Haze Analysis

Regional haze modeling was conducted with CALPUFF using the FLAG guidance for Bryce Canyon National Park, Capitol Reef National Park, Grand Canyon National Park, Sycamore Canyon Wilderness, and Zion National Park. In addition, regional haze modeling results have been provided for Lake Mead NRA using the FLAG guidance. The regional haze modeling results

## Table 8B-8
## Class I Area PSD Increment CALPUFF Modeling Results (2003 through 2005)

| Pollutant | Class I Area | Averaging Period | Maximum Modeled Concentrations (µg/m$^3$) 2003 | 2004 | 2005 | Class I SIL (µg/m$^3$) | PSD Class I Increment (µg/m$^3$) |
|---|---|---|---|---|---|---|---|
| $SO_2$ | Capitol Reef NP[1] | 3-hr[3] | 0.160 | 0.128 | 0.124 | 1.0 | 25 |
| | | 24-hr | 0.055 | 0.022 | 0.037 | 0.2 | 5 |
| | | Annual[4] | 0.002 | 0.001 | 0.001 | 0.1 | 2 |
| $SO_2$ | Sycamore Canyon W[1] | 3-hr[3] | 0.104 | 0.075 | 0.096 | 1.0 | 25 |
| | | 24-hr | 0.019 | 0.014 | 0.016 | 0.2 | 5 |
| | | Annual[4] | 0.001 | 0.0005 | 0.001 | 0.1 | 2 |
| $SO_2$ | Bryce Canyon NP[2] | 3-hr[3] | 0.161 | 0.137 | 0.996 | 1.0 | 25 |
| | | 24-hr | 0.035 | 0.024 | 0.184 | 0.2 | 5 |
| | | Annual[4] | 0.002 | 0.002 | 0.002 | 0.1 | 2 |
| $SO_2$ | Grand Canyon NP[2] | 3-hr[3] | 0.637 | 0.858 | 0.856 | 1.0 | 25 |
| | | 24-hr | 0.111 | 0.161 | 0.150 | 0.2 | 5 |
| | | Annual[4] | 0.004 | 0.005 | 0.004 | 0.1 | 2 |
| $SO_2$ | Zion NP[2] | 3-hr[3] | 0.574 | 0.454 | 0.552 | 1.0 | 25 |
| | | 24-hr | 0.093 | 0.064 | 0.123 | 0.2 | 5 |
| | | Annual[4] | 0.005 | 0.004 | 0.004 | 0.1 | 2 |
| $PM_{10}$ | Capitol Reef NP[1] | 24-hr | 0.047 | 0.012 | 0.031 | 0.3 | 8 |
| | | Annual | 0.002 | 0.001 | 0.001 | 0.2 | 4 |
| $PM_{10}$ | Sycamore Canyon W[1] | 24-hr | 0.013 | 0.012 | 0.014 | 0.3 | 8 |
| | | Annual | 0.001 | 0.0004 | 0.001 | 0.2 | 4 |
| $PM_{10}$ | Bryce Canyon NP[2] | 24-hr | 0.025 | 0.015 | 0.017 | 0.3 | 8 |
| | | Annual | 0.001 | 0.001 | 0.001 | 0.2 | 4 |
| $PM_{10}$ | Grand Canyon NP[2] | 24-hr | 0.069 | 0.124 | 0.079 | 0.3 | 8 |
| | | Annual | 0.003 | 0.004 | 0.003 | 0.2 | 4 |
| $PM_{10}$ | Zion NP[2] | 24-hr | 0.086 | 0.041 | 0.075 | 0.3 | 8 |
| | | Annual | 0.004 | 0.003 | 0.003 | 0.2 | 4 |
| $NO_2$ | Capitol Reef NP[1] | Annual | 0.0003 | 0.0002 | 0.0003 | 0.1 | 2.5 |
| $NO_2$ | Sycamore Canyon W[1] | Annual | 0.0001 | 0.00003 | 0.0001 | 0.1 | 2.5 |
| $NO_2$ | Bryce Canyon NP[2] | Annual | 0.0004 | 0.0003 | 0.001 | 0.1 | 2.5 |
| $NO_2$ | Grand Canyon NP[2] | Annual | 0.002 | 0.002 | 0.002 | 0.1 | 2.5 |
| $NO_2$ | Zion NP[2] | Annual | 0.002 | 0.001 | 0.001 | 0.1 | 2.5 |

[1] Impacts assessed on the 2-km meteorological and computational grid.
[2] Impacts assessed on the 500-m meteorological and computational grid.
[3] 3-hr $SO_2$ concentrations reflect a 483.8 lb/hr $SO_2$ limit.
[4] Annual $SO_2$ concentrations reflect a 1351 TPY $SO_2$ limit.

**Table 8B-9**
**Lake Mead NRA PSD Increment CALPUFF Modeling Results (2003 through 2005)**

| Pollutant | Class I Area | Averaging Period | Maximum Modeled Concentrations (µg/m³) 2003 | 2004 | 2005 | Class II SIL (µg/m³) | PSD Class II Increment (µg/m³) |
|---|---|---|---|---|---|---|---|
| $SO_2$ | Lake Mead NRA[1] | 3-hr[2] | 2.681 | 2.569 | 3.092 | 25.0 | 512 |
| | | 24-hr | 0.699 | 0.891 | 0.844 | 5.0 | 91 |
| | | Annual[3] | 0.045 | 0.059 | 0.052 | 1.0 | 20 |
| $PM_{10}$ | Lake Mead NRA[1] | 24-hr | 0.374 | 0.459 | 0.469 | 5.0 | 30 |
| | | Annual | 0.033 | 0.042 | 0.037 | 1.0 | 17 |
| $NO_2$ | Lake Mead NRA[1] | Annual | 0.039 | 0.057 | 0.045 | 1.0 | 25 |

[1] Impacts assessed on the 2-km meteorological and computational grid.
[2] 3-hr $SO_2$ concentrations reflect a 483.8 lb/hr $SO_2$ limit.
[3] Annual $SO_2$ concentrations reflect a 1351 TPY $SO_2$ limit.

are presented in **Table 8B-10** for the Class I areas and Lake Mead NRA for informational purposes. As shown in **Table 8B-10**, the regional haze modeling results using the FLAG guidance have no days above a 5 percent change in extinction at any Class I area during any year. Therefore, according to the FLAG guidance, the project does not have a significant regional haze impact and it is assumed that no further modeling is required. **Table 8B-10** does show impacts above 5 percent change in extinction for Lake Mead NRA, but since this area is not designated as a mandatory PSD Class I area, the same strict regional haze standards do not apply.

**Table 8B-10**
**Regional Haze CALPUFF Modeling Results – FLAG (2003 to 2005)**

| Class I Area | 2003 Days > than N% Δ $B_{ext}$ 5% | 2003 Days > than N% Δ $B_{ext}$ 10% | 2003 MAX% Δ $B_{ext}$ | 2004 Days > than N% Δ $B_{ext}$ 5% | 2004 Days > than N% Δ $B_{ext}$ 10% | 2004 MAX% Δ $B_{ext}$ | 2005 Days > than N% Δ $B_{ext}$ 5% | 2005 Days > than N% Δ $B_{ext}$ 10% | 2005 MAX% Δ $B_{ext}$ |
|---|---|---|---|---|---|---|---|---|---|
| ***MVISBK=2, FLAG Background, 2-km grid*** | | | | | | | | | |
| Capitol Reef NP | 0 | 0 | 3.04 | 0 | 0 | 1.42 | 0 | 0 | 2.17 |
| Sycamore Canyon W | 0 | 0 | 1.69 | 0 | 0 | 1.01 | 0 | 0 | 1.22 |
| Lake Mead NRA[1] | 27 | 0 | 9.83 | 46 | 10 | 14.70 | 28 | 5 | 16.37 |
| ***MVISBK=2, FLAG Background, 500 m grid*** | | | | | | | | | |
| Bryce Canyon NP | 0 | 0 | 4.03 | 0 | 0 | 0.91 | 0 | 0 | 1.85 |
| Grand Canyon NP | 0 | 0 | 2.75 | 0 | 0 | 4.33 | 0 | 0 | 3.32 |
| Zion NP | 0 | 0 | 4.70 | 0 | 0 | 1.95 | 0 | 0 | 4.61 |

[1] Sensitive Class II areas are not held to the 5 percent change in extinction significance threshold. Results are provided for informational purposes.

In addition to providing regional haze results for the FLAG procedure, results have been provided in **Table 8B-11** using the 2-tier BART approach as discussed in section 8B.3.2.4. These results also indicate that there are <u>no days</u> above a 5 percent change in extinction for any of the Class I areas using the Method 6 approach, and so the 98th percentile day for each year has an impact that is well below a 5 percent change in extinction. This further emphasizes that the project does not have an adverse impact on regional haze. Results also have been provided for Lake Mead NRA using this approach for informational purposes.

**Table 8B-11**
**Regional Haze CALPUFF Modeling Results – FLAG (2003-2005)**

| Class I Area | 2003 | | | | 2004 | | | | 2005 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days > than N% $\Delta B_{ext}$ | | MAX% $\Delta B_{ext}$ | 8th Highest % $\Delta B_{ext}$ | Days > than N% $\Delta B_{ext}$ | | MAX% $\Delta B_{ext}$ | 8th Highest % $\Delta B_{ext}$ | Days > than N% $\Delta B_{ext}$ | | MAX% $\Delta B_{ext}$ | 8th Highest % $\Delta B_{ext}$ |
| | 5% | 10% | | | 5% | 10% | | | 5% | 10% | | |
| ***MVISBK=6, 20% Best Natural Background, 2-km grid*** | | | | | | | | | | | | |
| Capitol Reef NP | 0 | 0 | 3.84 | 1.01 | 0 | 0 | 1.20 | 0.63 | 0 | 0 | 3.09 | 0.84 |
| Sycamore Canyon W | 0 | 0 | 1.19 | 0.53 | 0 | 0 | 1.11 | 0.49 | 0 | 0 | 1.00 | 0.44 |
| Lake Mead NRA[1] | 64 | 10 | 14.85 | 10.68 | 74 | 22 | 18.88 | 13.55 | 67 | 13 | 19.77 | 11.34 |
| ***MVISBK=6, 20% Best Natural Background, 500-m grid*** | | | | | | | | | | | | |
| Bryce Canyon NP | 0 | 0 | 2.85 | 0.74 | 0 | 0 | 0.88 | 0.55 | 0 | 0 | 1.71 | 0.52 |
| Grand Canyon NP | 0 | 0 | 3.00 | 1.82 | 0 | 0 | 3.99 | 2.49 | 0 | 0 | 2.93 | 1.96 |
| Zion NP | 1 | 0 | 5.06 | 1.97 | 0 | 0 | 2.04 | 1.50 | 1 | 0 | 5.24 | 1.37 |
| ***MVISBK=6, Annual Average Natural Background, 2-km grid*** | | | | | | | | | | | | |
| Capitol Reef NP | 0 | 0 | 2.97 | 0.78 | 0 | 0 | 0.93 | 0.49 | 0 | 0 | 2.39 | 0.65 |
| Sycamore Canyon W | 0 | 0 | 0.92 | 0.41 | 0 | 0 | 0.86 | 0.38 | 0 | 0 | 0.77 | 0.34 |
| Lake Mead NRA[1] | 42 | 3 | 11.50 | 8.27 | 52 | 8 | 14.62 | 10.49 | 43 | 5 | 15.31 | 8.78 |
| ***MVISBK=6, Annual Average Natural Background, 500-m grid*** | | | | | | | | | | | | |
| Bryce Canyon NP | 0 | 0 | 2.20 | 0.58 | 0 | 0 | 0.68 | 0.43 | 0 | 0 | 1.33 | 0.40 |
| Grand Canyon NP | 0 | 0 | 2.32 | 1.41 | 0 | 0 | 3.09 | 1.93 | 0 | 0 | 2.27 | 1.52 |
| Zion NP | 0 | 0 | 3.91 | 1.52 | 0 | 0 | 1.58 | 1.16 | 0 | 0 | 4.05 | 1.06 |

[1] Sensitive Class II areas are not held to the 5% change in extinction significance threshold. Results are provided for informational purposes.

### 8B.4.4 Acidic Deposition Analysis

CALPUFF modeling was used to provided upper limit estimates of annual (wet and dry) deposition of sulfur and nitrogen compounds (kg/ha/yr) associated with emissions of $SO_2$ and $NO_2$ from the propose project at Bryce Canyon National Park, Capitol Reef National Park, Grand Canyon National Park, Sycamore Canyon Wilderness, and Zion National Park to compare to NPS Class I DATs. The CALPOST program was used to obtain the maximum annual deposition impacts. The results are summarized in **Table 8B-12**.

**Table 8B-12**
**Deposition CALPUFF Modeling Results (2003-2005)**

| Pollutant | Class I Area | Averaging Period | Maximum Modeled Deposition Rate (kg/ha/yr) | | | NPS Class I Deposition Analysis Thresholds |
|---|---|---|---|---|---|---|
| | | | 2003 | 2004 | 2005 | (kg/ha/yr) |
| Sulfur[3] | Capitol Reef NP[1] | Annual | 0.0011 | 0.0012 | 0.0015 | 0.005 |
| | Sycamore Canyon W[1] | Annual | 0.0005 | 0.0006 | 0.0006 | 0.005 |
| | Bryce Canyon NP[2] | Annual | 0.0015 | 0.0018 | 0.0016 | 0.005 |
| | Grand Canyon NP[2] | Annual | 0.0012 | 0.0016 | 0.0018 | 0.005 |
| | Zion NP[2] | Annual | 0.0044 | 0.0045 | 0.0045 | 0.005 |
| | Lake Mead NRA[1] | Annual | 0.0081 | 0.0116 | 0.0117 | 0.005 |
| | | | | | | |
| Nitrogen | Capitol Reef NP[1] | Annual | 0.0007 | 0.0008 | 0.0010 | 0.005 |
| | Sycamore Canyon W[1] | Annual | 0.0003 | 0.0005 | 0.0004 | 0.005 |
| | Bryce Canyon NP[2] | Annual | 0.0009 | 0.0011 | 0.0020 | 0.005 |
| | Grand Canyon NP[2] | Annual | 0.0007 | 0.0011 | 0.0010 | 0.005 |
| | Zion NP[2] | Annual | 0.0025 | 0.0025 | 0.0024 | 0.005 |
| | Lake Mead NRA[1] | Annual | 0.0057 | 0.0082 | 0.0077 | 0.005 |

[1] Impacts assessed on the 2-km meteorological and computational grid.
[2] Impacts assessed on the 500-m meteorological and computational grid.
[3] Annual sulfur deposition rates reflect a 1351 TPY $SO_2$ limit.

The modeling results indicate that the proposed project has impacts below the DAT for sulfur and nitrogen deposition at all Class I areas and therefore no additional analyses should be required.

Acidic deposition results also have been provided for Lake Mead NRA for informational purposes.

## 8B.5 VISCREEN Results

There is no identified scenic vista within 50 km of the project site. However, as requested by the NPS, a local plume blight analysis was conducted for Lake Mead NRA using the visibility screening model, VISCREEN. The location of Lake Mead NRA in relation to TEP is shown in **Figure 8B-1**. The VISCREEN model is recommended by the USEPA as a screening tool to determine the visibility impacts for source-observer distances of up to 50 km.

The VISCREEN model was applied with Level-1 defaults and the expected emissions from the main stack. The source-observer distance was assumed to be 37 km. A background visual range of 252 km was used for the VISCREEN analysis. This visual range corresponds to the natural background extinction for the nearby Grand Canyon National Park of 15.5 $Mm^{-1}$ as listed in the *Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report* (December 2000). The following equation was used to calculate the visual range from the extinction at Grand Canyon (the closest Class I area to Lake Mead NRA):

$$V_r = 3.912 \times 1000 / \beta_{ext}$$

where: $\beta_{ext}$ = extinction in unit of $Mm^{-1}$

The expected total emissions from the main stack for $PM_{10}$ (121 lbs/hr) and $NO_X$ (362.9 lbs/hr), were input to VISCREEN.

Two separate VISCREEN runs were conducted to account for the cardinal wind directions that intersect Lake Mead NRA. Those two sectors include wind directions from due north and north-northeast. For each sector, the wind speed and stability class was derived according to the "Workbook" procedures. For the due north direction, VISCREEN was run with a wind speed of 6 m/s and a stability class of 4. For the north-northeast direction, VISCREEN was run with a wind speed of 4 m/s and a stability class of 4. These meteorological conditions were developed using 5 years of surface data from Las Vegas McCarran International Airport (1987 through 1991).

**Due North Sector:**

The maximum VISCREEN results inside Lake Mead NRA for color difference index ($\Delta E$) was 5.33 against sky and 9.42 against terrain. The maximum VISCREEN result inside the Class I area for contrast ($|C|$) was 0.106 against sky and 0.069 against terrain.

**North-Northeast Sector:**

The maximum VISCREEN results inside Lake Mead NRA for color difference index ($\Delta E$) was 1.37 against sky and 2.86 against terrain. The maximum VISCREEN result inside the Class I area for contrast ($|C|$) was 0.027 against sky and 0.019 against terrain.

Since there are no thresholds for PSD Class II areas, these values are provided for informational purposes.

### 8B.6 List of Meteorological Stations Used in CALMET

**Tables 8B-13** through **8B-15** list the meteorological stations that were used in the modeling.

## Table 8B-13
## Surface Stations used as Input to CALMET Meteorological Years 2003-2005

| WMO | Station Name | State | Latitude | Longitude | Elevation (m) | LC_X* (km) | LC_Y* (km) | Time Zone |
|---|---|---|---|---|---|---|---|---|
| 723700 | Kingman (AMOS) | AZ | 35.260 | -113.950 | 1033.0 | -129.440 | -155.262 | 7 |
| 723710 | Page Muni (AMOS) | AZ | 36.930 | -111.450 | 1304.0 | 91.356 | 25.533 | 7 |
| 723723 | Prescott Love Field | AZ | 34.650 | -112.410 | 1536.0 | 8.109 | -222.881 | 7 |
| 723740 | Winslow Municipal A | AZ | 35.030 | -110.710 | 1490.0 | 160.346 | -179.684 | 7 |
| 723755 | Flagstaff Pulliam A | AZ | 35.130 | -111.660 | 2131.0 | 75.137 | -170.193 | 7 |
| 723783 | Grand Canyon Park | AZ | 35.950 | -112.150 | 2014.0 | 30.918 | -81.336 | 7 |
| 723788 | Bullhead City | AZ | 35.160 | -114.560 | 167.0 | -184.164 | -164.951 | 7 |
| 723805 | Needles Airport | CA | 34.760 | -114.610 | 278.0 | -189.781 | -208.393 | 8 |
| 723860 | Las Vegas McCarran | NV | 36.080 | -115.150 | 648.0 | -233.582 | -63.416 | 8 |
| 723865 | Nellis AFB | NV | 36.250 | -115.030 | 573.0 | -222.425 | -45.309 | 8 |
| 724735 | Hanksville | UT | 38.360 | -110.710 | 1313.0 | 152.272 | 181.375 | 7 |
| 724754 | Saint George (AWOS) | UT | 37.080 | -113.600 | 896.0 | -95.483 | 41.844 | 7 |
| 724755 | Cedar City Municipal | UT | 37.700 | -113.100 | 1702.0 | -51.580 | 108.507 | 7 |
| 724756 | Bryce Canyon | UT | 37.700 | -112.150 | 2312.0 | 30.088 | 108.379 | 7 |
| 724776 | Moab/Canyonlands | UT | 38.750 | -109.750 | 1388.0 | 232.465 | 225.790 | 7 |
| 724797 | Milford Municipal A | UT | 38.450 | -113.030 | 1535.0 | -45.025 | 189.546 | 7 |
| 724846 | N Las Vegas | NV | 36.210 | -115.200 | 671.0 | -237.511 | -49.161 | 8 |
| 724860 | Ely Yelland Field | NV | 39.300 | -114.850 | 1908.0 | -196.920 | 284.042 | 8 |
| CAN407 | Canyonlands National Park | UT | 38.458 | -109.821 | 1814.0 | 227.511 | 194.100 | 7 |
| GRB411 | Great Basin National Park | NV | 39.005 | -114.216 | 2060.0 | -144.468 | 250.903 | 8 |
| PET427 | Petrified Forest | AZ | 34.875 | -109.969 | 1723.0 | 227.204 | -194.770 | 7 |
| GRC474 | Grand Canyon National Park | AZ | 36.060 | -112.182 | 2073.0 | 28.026 | -69.432 | 7 |

* Coordinates are based on a Lambert Conformal Coordinate System
Origin = 36.70N, 112.50W
Standard Parallels = 30N, 60N
False Easting and Northing = 0.0, 0.0
World Geodetic System of 1984, (GCS_WGS_1984)

## Table 8B-14
## Precipitation Stations used as Input to CALMET Meteorological Years 2003-2005

| COOP ID | Station Name | State | Latitude | Longitude | LC_X* (km) | LC_Y* (km) | Time Zone |
|---|---|---|---|---|---|---|---|
| 020487 | Ash Fork 3 | AZ | 35.199 | -112.489 | 1.018 | -163.087 | 7 |
| 021574 | Chevelon RS | AZ | 34.540 | -110.915 | 143.018 | -233.466 | 7 |
| 023010 | Flagstaff AP | AZ | 35.144 | -111.666 | 74.550 | -168.656 | 7 |
| 024586 | Keams Canyon | AZ | 35.811 | -110.192 | 204.317 | -93.550 | 7 |
| 025344 | Mayer NO 2 | AZ | 34.394 | -112.223 | 25.076 | -250.808 | 7 |
| 025635 | Montezuma Castle NM | AZ | 34.611 | -111.838 | 59.679 | -226.940 | 7 |
| 027708 | Sedona | AZ | 34.896 | -111.764 | 66.030 | -195.819 | 7 |
| 028778 | Truxton Canyon | AZ | 35.388 | -113.659 | 103.302 | -141.751 | 7 |
| 028895 | Tuweep | AZ | 36.286 | -113.064 | -49.530 | -44.730 | 7 |
| 029158 | Walnut Creek | AZ | 34.928 | -112.810 | -27.790 | -192.527 | 7 |
| 029439 | Winslow AP | AZ | 35.028 | -110.721 | 159.381 | -179.917 | 7 |
| 046115 | Needles | CA | 34.830 | -114.594 | 188.108 | -200.806 | 8 |
| 046118 | Needles AP | CA | 34.768 | -114.619 | 190.559 | -207.555 | 8 |
| 046699 | Parker Reservoir | CA | 34.290 | -114.171 | 151.356 | -260.549 | 8 |
| 262557 | Elgin | NV | 37.348 | -114.543 | 176.589 | 72.444 | 8 |
| 263340 | Great Basin National Part | NV | 39.009 | -114.227 | 145.374 | 251.340 | 8 |
| 265846 | Overton | NV | 36.551 | -114.458 | 171.356 | -14.083 | 8 |
| 267750 | Spring Valley State Park | NV | 38.041 | -114.180 | 143.641 | 146.654 | 8 |
| 420086 | Alton | UT | 37.440 | -112.482 | 1.559 | 80.206 | 7 |
| 420168 | Angle | UT | 38.249 | -111.961 | 45.951 | 167.791 | 7 |
| 420522 | Beaver 4 E | UT | 38.280 | -112.568 | -5.774 | 171.031 | 7 |
| 421008 | Bryce Canyon NP HQRS | UT | 37.641 | -112.169 | 28.491 | 102.001 | 7 |
| 421260 | Cedar City 5E | UT | 37.656 | -112.992 | -42.320 | 103.725 | 7 |
| 421267 | Cedar City AP | UT | 37.709 | -113.094 | -51.095 | 109.435 | 7 |
| 422256 | Duck Creek Village | UT | 37.525 | -112.663 | -14.056 | 89.390 | 7 |
| 422561 | Enterprise Beryl Junction | UT | 37.770 | -113.656 | -99.227 | 116.573 | 7 |
| 423418 | Green River Aviation | UT | 38.991 | -110.154 | 197.526 | 250.658 | 7 |
| 423611 | Hanksville | UT | 38.371 | -110.715 | 151.798 | 182.506 | 7 |
| 423780 | Hatch Sevier River | UT | 37.651 | -112.430 | 5.998 | 103.056 | 7 |
| 425477 | Marysvale | UT | 38.450 | -112.229 | 23.008 | 189.436 | 7 |
| 425654 | Milford | UT | 38.394 | -113.017 | -43.979 | 183.537 | 7 |
| 427260 | Richfield Radio KSVC | UT | 38.762 | -112.078 | 35.715 | 223.181 | 7 |
| 427516 | St. George | UT | 37.107 | -113.561 | -92.069 | 44.717 | 7 |
| 429136 | Veyo Power House | UT | 37.352 | -113.667 | 100.840 | 71.407 | 7 |
| 429717 | Zion National Park | UT | 37.208 | -112.984 | -41.944 | 55.217 | 7 |

* Coordinates are based on a Lambert Conformal Coordinate System
Origin = 36.70N, 112.50W
Standard Parallels = 30N, 60N
False Easting and Northing = 0.0, 0.0
World Geodetic System of 1984, (GCS_WGS_1984)

**Table 8B-15**
**Upper Air Stations used as Input to CALMET Meteorological Years 2003-2005**

| WBAN | Station Name | State | Latitude | Longitude | LC_X* (km) | LC_Y* (km) | Time Zone |
|---|---|---|---|---|---|---|---|
| 03160 | Desert Rock/Mercury | NV | 36.620 | -116.020 | -307.648 | -1.912 | 8 |
| 23066 | Grand Junction | CO | 39.120 | -108.530 | 333.544 | 270.004 | 7 |
| 53103 | Flagstaff/Bellemt (Army) | AZ | 35.230 | -111.820 | 60.733 | -159.442 | 7 |

* Coordinates are based on a Lambert Conformal Coordinate System
Origin = 36.70N, 112.50W
Standard Parallels = 30N, 60N
False Easting and Northing = 0.0, 0.0
World Geodetic System of 1984, (GCS_WGS_1984)

## 8B.7 References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